

New Species of Primula.

BY

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II.

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Primula aerinantha, Balf. fil. et Purdom. (Muscarioides.)

Perennis rhizomate parvulo foliis rosulatis petiolatis. Folia ad 8 cm. longa; lamina tenuis membranacea oblonga vel elliptica ad 5 cm. longa ad 3 cm. lata apice rotundata nunc subobtusata margine leviter serrato-denticulata dentibus hydatthodo apiculato terminatis breviter ciliata utrinque sparsim puberula subtus pallidior pilis longioribus paucis costam mediam basim versus obtegentibus deorsum in petiolum ad 4 mm. longum vix viride alatum haud vaginantem gradatim attenuata. Scapus pro planta altus ad 30 cm. tenuis infra glaber supra inflorescentiam versus albo-farinosus spicam terminalem capitata brevem plurifloram gerens; bracteae deflexae inferiores fertiles virides ligulae acutae circa 5 mm. longae haud vaginatae plus minusve albo-farinosae superiores floribus inhibitis axillantes latiores purpurascens spicam coronantes; pedicelli nulli; anthopodium nullum. Flores dense aggregati. Calyx ad 4 mm. longus plus minusve albo-farinosus poculiformis latus tubo membranaceo lobis tubum aequantibus inaequalibus posteriore maximo lanceolatis subacutis venulosis. Corollae omnino purpureae oculo pallidiore efarinosae tubus angustissimus in flore brevistylis circ. 1.2 cm. longus erugosus exannulatus cylindricus supra stamina inflatus ad faucem constrictus, limbi concavi discus 1 mm. latus, lobi erecti obovati profunde emarginati segmentis integris divaricatis sinuque mucronato. Stamina filamentis brevissimis antheris angustis circ. 1.5 mm. longis connectivo purpurascens in flore brevistylis supra medium tubi corollini inserta antherarum apicibus ab ore circ. 1.5 mm. remotis in longistylis infra medium inserta antheris ultra calycem exsertis. Ovarium globosum; styli delicatissimi brevis tubo corollae dimidio brevior, longus quadrante brevior; stigma parvulum capitatum. Capsula muro crustaceo late globosa parte superiore ultra calycis segmenta prolata inferiore calycis tubo inclusa ab apice ad basim valvis concavis latis 5 dehiscens; placenta succulenta lata discoidea viridis infra centraliter affixa ex toto seminifera. Semina minutissima oblonga circ. 1 mm. longa vix 0.3 mm. lata complanata margine cellulis testae aeriferis alata.

Species Sectionis Muscarioidis bene distincta *P. cernuae*, Franch. proxima sed foliis longe petiolatis margine denticulato-serratis, corollae tubo angusto longiore petalisque obovatis fere bifidis diversa.

West Kansu. Lien-wha-shan. Alt. 9000-12,000 ft. Purdom. No. 738. 1911. In Herb. Kew.

"Kansu. Only known so far in one big gully on Lotus Mountain, where it occurs sparingly on mossy banks and ledges of a

limestone cañon with pines above it on either side. An interesting glabrous *Giraldiana* with small and very fragrant flowers of soft clear blue." July 1914. Farrer and Purdom. No. 273. P. 23. In Herb. Edin.

A distinct plant of the Muscarioid Section found first of all by Purdom in 1911 when collecting for Veitch. I do not know that Veitch raised plants from it. Its nearest ally is the imperfectly described *P. cernua*, Franch. from which it is readily told by its foliage and the flowers with delicate corolla tube and cut petals. Purdom's flowering specimens now in the Kew Herbarium are the basis of the description. The specimens collected by Farrer and Purdom in 1914 are in fruit and enable me to complete the description. The plant flowered at Edinburgh in 1916. It is a distinct and pleasing member of its section.

***Primula anisodora*, Balf. fil. et Forrest. (Candelabra.)**

Aromatica odore anisi glaberrima efarinosa. Folia ad 2 dm. longa ad 7 cm. lata elongato-obovata apice obtusa vel rotundata membranacea venis haud prominulis argute irregulariter denticulata plus minusve glanduloso-foveolata in petiolum alatum vaginantem lamina brevior attenuata. Scapus ad 6 dm. altus validus umbellam terminalem et verticillos 3-5 ad 8-floros gerens; bracteae ad 7 mm. longae lineari-acuminatae hydathodo terminatae; pedicelli bracteis duplo longiores a basi subnantes post anthesin erecti aucti. Calyx ad 5 mm. longus cupuliformis ad trientem fissus lobis triangulari-ovatis nervo prominulo margine membranaceis minute fimbriato-erosis fimbriis hydathodo terminatis. Corollae infundibuliformis nigro-purpureae subcrassiusculae tubus ad 9 mm. longus aureo-annulatus annulo inaequaliter 10-lobato lobis antipetalis 5 majoribus interpetalis 5 minoribus intus supra stamina glanduloso-puberulus infra membranaceus, limbi concavi discus vix 1 mm. latus, lobi breves subquadrati subtruncati imbricati erecti ad 3.5 mm. longi ad 5 mm. lati crassi leviter emarginati crenulati. Stamina floris brevistyli supra medium tubi corollini inserta antherarum apicibus ab annulo 1 mm. remotis longistyli fere ad basim corollae antherarum apicibus 4 mm. ab annulo. Ovarium globosum; stylus brevis vix calycem aequans, longus corollae tubo dimidio brevior; stigma subglobosum. Capsula subglobosa calycem vix auctum paullo superans stylopodio nigro-rubro crenulato coronata valvis 5 dehiscens.

Species efarinosa aromatica floribus intense purpureis; a *P. glycosmate*, Petitm. foliis brevioribus, bracteis longioribus, corolla nigro-purpurea, lobis petalinis brevibus subquadrangularibus distincta.

"Yunnan. Mountains of the Chungtien plateau. Open moist alpine pasture. Lat. $27^{\circ} 55'$ N. Alt. 11,000 ft. Plant of 20-30 inches. All parts when fresh strongly aromatic with an odour resembling aniseed. Flowers deep plum-purple, almost black, drying a lighter shade." G. Forrest. No. 10,617. July 1913.

"Yunnan. Chungtien plateau. Alt. 10,000 ft. Lat. $27^{\circ} 30'$ N. Plant of 2-3 ft. Flowers deep black-purple, drying lighter. Strongly fragrant with an odour like aniseed. Open moist meadows." G. Forrest. No. 12,730. July 1914.

This species has the darkest coloured flowers of all Candelabra Primulas—perhaps of all wild Primulas. It belongs to the series of the efarinose purple-flowered Candelabras in which the redolent gland secretion is profuse. Of that series we now know seven species:—*P. Poissonii*, Franch., *P. Wilsoni*, Dunn, *P. glycosma*, Petitm., *P. Miyabeana*, Ito et Kawakami, *P. oblanceolata*, Balf. fil., *P. ianthina*, Balf. fil et Cave, and *P. anisodora*, Balf. fil. et Forrest. The odour is least marked in *P. Poissonii*, where it is sometimes hardly perceptible; and in *P. oblanceolata* it is, though evident, not very conspicuous. But in all the others the perfume is strong even in dried material.

P. anisodora is not far removed from *P. glycosma*. The two species are marked out amongst the efarinose purple-flowered Candelabras by the dark, nearly black, purple colour of their corollas—paler in *P. glycosma* than in *P. anisodora*—and they are about the most aromatic of the series. In dried specimens the difference between the species is not difficult to make out:—the broader shorter leaves of *P. anisodora* and their more glaucous under surface; the long petiole in *P. glycosma*; the very short bracts of *P. anisodora*, and its more delicate longer pedicels; the slightly larger calyx with somewhat fimbriate not sharply apiculate lobes of *P. anisodora*; and, most striking, the corolla, which in *P. anisodora* is funnel-shaped with a concave limb ending in somewhat quadrate truncate lobes, whilst in *P. glycosma* there is the funnel-shaped tube, but the concave limb expands into a series of rounded broad segments.

From seed obtained by Mr. Forrest plants of *P. anisodora* have been raised and flowered at Edinburgh. The flower colour recalls that of some of the brown auriculas with yellow eye. Mr. Forrest tells me seeds of *P. glycosma*, are in his collection also, and we may hope, therefore, for a crop of living plants which will enable us to appraise more accurately the relationships of the two forms. They ought to

be interesting garden plants on account of their flower colour, and I expect that they will prove to be as hardy and resistant as that hardiest of all Candelabras, *P. Poissonii*. They will certainly do much by hybridisation for colour tint in *Primula*.

***Primula aureostellata*, Balf. fil. et Cooper. (Amethystina.)**

Rhizoma parvum radicibus erubescens foliis floribusque coaetaneis. Folia crasse coriacea redolentia ad 7 cm. longa ad 1.5 cm. lata vix distincte petiolata lanceolata vel oblanceolata vel oblonga acuta margine rigide cartilaginea denticulis firmis paucis triangularibus subaculeatim praedita deorsum gradatim in basim ligulatam membranaceo-alatam integram attenuata utrinque pilosa glanduloso-foveolata supra pallide viridia subtus pallidiora nunc subglauca. Scapus elatus ad 3-5 cm. altus glaber umbellam subsecundam parvam ad 6-floram gerens; bractee sublineares subulatae subfoveolatae ad 6 mm. longae basi extus pulvinatim incrassatae pedicellos adhaerentes; pedicelli breves ad 6 mm. longi subglandulosi; anthopodium parvum. Calyx coriaceus viridis tubulosus circ. 8 mm. longus 5-costatus extus glanduloso-foveolatus lobis circ. 3 mm. longis sublanceolatis obtusis margine membranaceis. Corollae coriaceae tubus in flore longistylus calycem subaequans circ. 8 mm. longus cylindricus supra stamina paulo amplius flavidus intus puberulus exannulatus, limbus subplanus aureus albido-marginatus disco circ. 2 mm. lato extus intusque glanduloso-puberulo lobis ad 9 mm. longis anguste obovatis basi contractis emarginatis. Stamina basim tubi corollini versus inserta filamentis conspicuis strumis corollinis pseudo-annulatim conjunctis antheris angustis ad 2 mm. longis. Ovarium ovoideum; stylus longus fragilis corollae tubum subaequans; stigma parvum globosum. Capsula circ. 9 mm. longa 4 mm. lata calyce omnino inclusa ab apice valvis 5 brevibus incrassatis dehiscens; placenta cylindrica breviter crasseque stipitata circ. 5.5 mm. longa. Semina grisea elongata circ. 1.5 mm. longa .75 mm. lata complanata (ac tamen angulata) laevia nec prominenter vesiculosae tuberculata.

Species ex affinitate Sectionis Amethystinae foliis glanduloso-foveolatis floribus subsecundis corollae limbo aureo-stellato notata.

"Bhutan. Kempé La, Pumthang. Alt. 11,000 ft. In marsh. Flower open, white, yellow star-blotch on centre, glistening hairs in mouth." R. E. Cooper. No. 4173. 23rd July 1915.

This species has the appearance of *P. Faberi*, Oliv., a yellow-flowered member of the Amethystina Section, but is readily

distinguished by its foveolate leaves and smaller flowers. It has the smooth soap-like seed of *P. Kingii*, Watt—a characteristic purple-red-flowered Indian member of the Section. We do not know enough yet about the species in this Section to sanction critical treatment, and in placing *P. aureostellata* in the Section at the moment I do so with reserve.

***Primula brevicula*, Balf. fil. et Forrest. (Pulchella.)**

Caespitosa albo-farinosa rhizomate multicipite vestigiis siccis plurimis foliorum praeteritorum dense oblecto foliis petiolatis late vaginantibus. Folia ad 10 cm. longa subspathulata; lamina ad 1.5 cm. lata elliptica vel oblongo-elliptica vel oblonga vel oblanceolata apice obtusa vel subacuta margine regulariter serrata subrecurva basi in petiolum lamina plerumque longiorem late vaginantem attenuata supra pilis fariniferis sparsissime praedita subtus dense albo-farinosa. Scapus ad 12 cm. longus validus praesertim infra flores plus minusve albo-farinosis umbellam ad 6-floram gerens; bractae lineari-subulatae ad 1 cm. longae basi latiores et subtus quasi leviter pulvinatim incrassatae purpurascens plus minusve albo-farinosae; pedicelli bracteis subaequantes vel eis breviores sub fructu accrescentes erecti albo-farinosi in anthopodium gradatim incrassati. Flos fragrans. Calyx ad 8.5 mm. longus breviter campanulatus extus atropurpureus et plus minusve albo-farinosis fere ad basim fissus lobis angustis ligulatis acutis intus dense albo-farinosus. Corollae azureae floris brevistylis tubus membranaceus circ. 1 cm. longus cylindricus supra stamina amplius intus obscure rugosus annulatus annulo tenui, limbi discus angustus vix 0.5 mm. latus, lobi ad 9 mm. longi obovati tridentati. Stamina floris brevistylis filamentis conspicuis tenuibus deorsum expansis et inter se basi conjunctis antheris circ. 2.5 mm. longis apiculatis supra medium tubi corollini inserta antherarum apicibus circ. 1.5 mm. ab annulo remotis et calyce vix longioribus. Ovarium globosum; stylus brevis calyce dimidio brevior; stigma magnum discoideum recurvum lobulatum. Capsula circ. 1.2 cm. longa cylindrica calycem paullo superans straminea crustacea apice valvis 5 primariis recurvis saepe fissis dehiscens; placenta brevis circ. 3 mm. longa claviformis vix stipitata.

Species *P. minori*, Balf. fil. et Ward affinis sed albo-farinosa.

"Yunnan. Western flank of the Lichiang Range. Alt. 13,000 ft. Lat. 27° 25' N. Plant of 3-5 inches. Ledges of limestone cliffs. Very rare." G. Forrest. No. 6425. August 1910.

"Yunnan. Mountains in the N.E. of the Yangtze bend. Alt. 12,000-13,000 ft. Lat. 27° 40' N. Plant of 3-5 inches.

Flowers blue, eye purplish-yellow, fragrant. Moist limy pasture and the ledges of limestone cliffs." G. Forrest. No. 10,405. July 1913.

Mr. Forrest obtained this plant in course of his second exploration of Yunnan, but only in fruit. Specimens in his 1913 and 1914 collections with flower enable a determination of the species to be made. It is one of the *Pulchella* series, but is distinguished alike from *P. pulchella*, Franch. and *P. minor*, Balf. fil. et Ward by the copious white mealy covering. It has flowered at Edinburgh and seems to be thoroughly hardy. Its glossy foliage marks it at sight as distinct from *P. minor*.

***Primula cana*, Balf. fil. et Cave. (Rotundifolia.)**

Planta cana rhizomate longo breviter ramoso profuse radiante foliorum scaporumque vestigiis siccis intertextis involutis densissime oblecto. Gemmae squamis elongatis crustaceis margine membranaceis imbricatis dense sulphureo-farinosis circumdatae. Folia longe petiolata ad 9 cm. longa; lamina oblonga vel elliptico-oblonga vel subrotundata ad 5 cm. longa ad 3.5 cm. lata crasse coriacea subaequaliter dentata dentibus obtusis vel acutis hydathodo terminatis nonnunquam denticulatis basim versus in petiolum erubescens anguste alatum longe vaginantem cuneatim attenuata nec cordata supra viridis puberula subtus dense sulphureo-farinoso. Scapus circ. 10 cm. longus plus minusve farinosus umbellam ad 16-floram gerens; bractae lineari-subulatae circ. 1.2 cm. longae dense sulphureo-farinosae basi extus leviter pulvinatim incrassatae; pedicelli sub anthesi circ. 2 cm. longi filiformes sulphureo-farinosi plus minusve divaricatim nutantes sub fructu stricti et inaequaliter elongati fere ad 5.5 cm. spadiceo-brunnei glabri; anthopodium conspicuum anguste obconoidum. Calyx circ. 1 cm. longus extus intusque dense sulphureo-farinosus late infundibuliformis ultra medium fissus, lobis a basi angusta lanceolato-acuminatis circ. 7 mm. longis subpatentibus. Corollae in flore longistylus tubus angustus cylindricus circ. 1 cm. longus infra staminum insertionem constrictus supra vix amplius membranaceus extus plus minusve farinosus intus erugulosus laevis ad faucem annulo flavo 5-lobato parvo cinctus, limbi plani discus angustus circ. 1 mm. latus, lobi angusti obovati circ. 8 mm. longi vix 5 mm. lati leviter crenulati. Stamina infra medium tubi corollini inserta calyce breviora filamentis distinctis 0.5 mm. longis antheris circ. 2 mm. longis apiculatis. Ovarium ellipsoideum stylopodio coronatum; stylus longus filiformis fere exsertus; stigma capitatum. Capsula spadicea calyce omnino inclusa oblonga circ. 8 mm. longa vix 3 mm. diam. valvis 5 saepe fassis crustaceis brevibus reflexis ab apice dehiscens;

placenta circ. 4 mm. longa cylindrica stipite conspicuo circ. 1 mm. longo. Semina angulata ellipsoidea nunc complanata circ. 0.75 mm. diam. pallide fulva testae vesiculis magnis notata.

Species ex affinitate *P. rotundifoliae*, Wall. foliis basi cuneatis, calyce tubum corollinum angustum aequante bene distincta.

Sikkim. Cave. Nos. 1423, 1513.

There are no particulars of the precise locality in Sikkim whence Mr. Cave derived the specimens of this plant. It is easily recognised amongst all forms belonging to the immediate circle of *P. rotundifolia*, Wall. by the cuneately-based leaves, the copiously branched inflorescence and the large calyx. The whole plant is hoary with abundant meal.

***Primula cardiophylla*, Balf. fil. et W. W. Sm. (*Rotundifolia*.)**

P. rotundifolia, Hook. fil. in Fl. Brit. Ind. iii (1882), 483, pro pte.; Pax Monogr. Primul. in Engl. Pflanzenr. (1905), 120, p.p.

Planta robusta rhizomate crasso profuse radicante radicibus rubicundis foliorum scaporumque vestigiis siccis dense oblecto in siccitate petiolis ligulatis inter se contortis et circum scapos strictos plus minusve volutis. Gemmae squamulis utrinque sulphureo-farinosis ovato-acuminatis persistentibus imbricatum vestitae. Folia plurima redolentia longe petiolata sub anthesi circ. 14 cm. longa postea aucta; lamina carnosula cucullata cordato-reniformis vel cordato-orbicularis circ. 4-6 cm. diam. sub fructu aucta lobis basalibus rotundatis conniventibus sinum angustum claudentibus margine dentata dentibus inaequalibus triangularibus obtusis hydathodo apiculatis supra laete viridis glandulis minutis capitatis subviscidis oblecta subtus dense sulphureo-farinosa; petiolus crassus ad 10 cm. longus in juventute plus minusve sulphureo-farinosus deinde glanduloso-puberulus canaliculatus exalatus basim versus dilatatus ibique subalatus et plus minusve erubescens. Scapus validus sub anthesi ad 22 cm. altus sub fructu multo longior plus minusve sulphureo-farinosus umbellam ad 16-floram globosam solitariam gerens nunc verticillis 1-2 accessoriis inferioribus multifloris inter se remotis praeditus; bractee dense farinosae lineares subulatae ad 1.5 cm. longae pedicellis sub anthesi longiores vel eos aequantes nunc breviores; pedicelli ad 2 cm. longi plus minusve filiformes dense farinosi; anthopodium crassum turbina-tum circ. 2.5 mm. longum. Calyx circ. 6 mm. longus crassus extus intusque farinosus fere ad basim fissus tubo poculiformi lobis trinerviis oblongis obtusis rarius denticulatis. Corollae tubus in flore brevistylis 1.4 cm. longus infra cylindricus supra calycem erubescens ibique extus glaber supra stamina paulo ampliatus ibique extus pallide viridis et farinosus intus

erugulosus ad os pentagonum annulatus annulo 5-lobato, limbi plani vel subrepandi malvaceo-purpurei utrinque plus minusve farinosi discus circ. 1 mm. latus, lobi late obovati vel orbiculares circ. 8 mm. diam. apice subretusi vel subcrenulati. Stamina ad faucem tubi corollini inserta antherarum apicibus circ. 1 mm. ab annulo remotis filamentis conspicuis viridescenscentibus brevibus antheris latis circ. 1.5 mm. longis connectivo viridi-colorato apiculato. Ovarium breviter cylindricum; stylus brevis calycem aequans vel paulo longior; stigma spongiosum magnum subcylindricum vel turbinatum albidum. Capsula ad 9 mm. longa crasse crustacea calyce dimidio longior spadiceo-fusca valvis 5 reflexis ab apice dehiscens; placenta cylindrica circ. 4 mm. longa breviter stipitata. Semina nigra oblonga angulata circ. 0.75 mm. longa; testa grosse vesiculosa.

Species olim cum *P. rotundifolia*, Wall. confusa sed robustior et foliis majoribus, bracteis multo longioribus, calycis lobis latioribus, corollae lobis rotundatis notisque aliis diversa.

Sikkim. Interior. J. D. Hooker. May 1848. In Herb. Kew.

Sikkim. Sandakphu and Singaleelah Range. Alt. 12,000–13,000 ft. Watt. No. 5375. 1881. In Herb. Kew, Calc., Edin.

Sikkim. Sandakphu. Alt. 11,700 ft. Lace. No. 2255. 23rd May 1902. In Herb. Calc.

Sikkim. Sandakphu. Alt. 11,000 ft. Rhomoo. No. 2196. 3rd Jan. 1909. In Herb. Edin.

Sikkim. Sandakphu. Alt. 12,000 ft. Cave. 15th Jan. 1912, 30th May 1913. In Herb. Edin.

Specimens showing enlarged fruiting state:—

Sikkim. Kurz. Oct. 1868. In Herb. Calc.

Sikkim. Sandakphu. 12,000 ft. Gamble. No. 65c. Oct. 1875. In Herb. Calc.

Sikkim. Sandakphu. 12,000 ft. King's Collector. 1888. In Herb. Calc.

Sikkim. Sandakphu. 11,000 ft. No. 11,593. Oct. 1898. In Herb. Calc.

Sikkim. Sandakphu. 11,000 ft. Cave. No. 6323. 2nd Aug. 1915. In Herb. Calc.

Most Indian botanists have identified with *P. rotundifolia*, Wall. from Gossain Than in Nepal some plants from about Sandakphu and Singaleelah in S.W. Sikkim. But these Sikkim plants are not, or at any rate not all, Wallich's species. Sir Joseph Hooker has indicated his doubt of the identity of the Sikkim and Nepalese plants on a sheet in the Kew Herbarium of specimens collected by himself in 1848, and marked "interior of Sikkim." Whether or no that means the south-western corner whence all other herbarium material is derived I cannot say, but certainly this plant is the same as many of the Sandakphu ones.

I find that Mr. Craib has also queried in Kew Herbarium the identification of the Sikkim and the Nepal plants.

I have had opportunity of examining four sheets of Wallich's species—one in the Kew Herbarium and three in the Calcutta Herbarium—and I come to the same conclusion as Sir Joseph Hooker and Mr. Craib. I am indeed not convinced that all the Sandakphu and Singaleelah plants are of one species, and the suggestion of this difference amongst them, and that there may be two species, or at least microforms, is based not only upon examination of herbarium material but also upon recollection of cultivated plants. We used to grow at Edinburgh a plant under the name of *P. rotundifolia* (raised from Calcutta seed) of which I have the following note:—leaves small, sulphur-mealy below, with delicate petioles, a scape bearing a single umbel of pink flowers with short bracts and longer pedicels, the corolla tube was funnel-shaped, with the tips of the anthers in the short-styled flowers close up to the annulus though not exerted, and the style itself nearly twice as long as the calyx. I do not recollect a great increase of leaf development after flowering and as the fruits matured. Our plant of to-day under the name of *P. rotundifolia*—it came to us from Mr. Cave at Darjeeling—is a much more robust one, with leaves having stout petioles and enlarging to twice the flowering size during fruiting; the single flower umbel is often subtended by a whorl of flowers, the flowers themselves are subtended by bracts longer than or as long as the pedicels, and have a narrow cylindric tube to their corolla, and the tips of the stamens in the short-styled plant are a little below the mouth of the throat, the short style being hardly longer than the calyx. As cultivated plants the two are very different. I have not dried specimens of the two plants to stimulate recollection. They were too precious to sacrifice for the herbarium, and now we seem to have lost the old plant. Of it I have only a couple of flowers preserved in spirit for comparison. Therefore my saying about it is somewhat indefinite and would not have been introduced here but that I think the dried specimens in herbaria seem to support and are not hostile to the view that there are two distinct plants, and I would like to ask collectors to observe carefully the plants in their native habitat. Here I am contenting myself (along with Mr. Smith) with demarking under the name *P. cardiophylla*, Balf. fil. et W. W. Sm. from Wallich's *P. rotundifolia* the plant of which Sir Joseph Hooker had doubts and with which may be associated specimens of other collectors as cited above. This is the plant we have now growing at Edinburgh, and no longer to be called *P. rotundifolia*, Wall.

Of specimens hitherto called *P. rotundifolia*, Wall. which are

not that species and which are perhaps not *P. cardiophylla*, Balf. fil. et W. W. Sm. I cite here:—

Sikkim. 11,000 ft. Tanner. In Herb. Calc.

Sandakphu. 12,000 ft. Clarke. No. 13,707 C. (in Herb. Calc.); 13,707 J. (in Herb. Kew). 5th June 1884.

Sandakphu. King's Collector. June 1887. 12,000 ft. June 1888. In Herb. Calc.

Sandakphu. 11,800 ft. Gammie. No. 14. 10th June 1891. In Herb. Calc.

Sandakphu. Rhomoo. No. 285. 30th May 1908. In Herb. Edin.

Sandakphu. Rhomoo. No. 782. 21st July 1910. In Herb. Edin.

I may point out that the increase in size of leaf by the time fruit is mature is remarkable, the petiole and lamina sharing equally in the increase. And this leads me to speak of a specimen in the Kew Herbarium which bears the label "*Primula rotundifolia*, Wall. var.—Laka, 11,000 ft. Dhurmsala, Clarke, No. 24,559. 17th Oct. 1874." In pencil on the sheet is written "*P. tricosolata*, Watt." There are specimens of two distinct species on the sheet. One specimen is a scrap of a fruiting scape, and it might belong to *P. cardiophylla*. The rest of the specimens, also fragmentary—four leaves, a rhizome, and portions of two scapes bearing fruit—supposing them to be of one species—belong to a plant of quite a different Section. The calyx is that of one of the Geranioides, and its ribbing has given origin apparently to the MS. name. The leaves and the rhizome bud would suit Geranioides, but there is no Indian species of the Section with similar leaves and fruit. The leaves recall those of *P. mollis*, Hook., but the scapes do not. It is a plant to be looked for. Why it calls for mention here is that in "*Flora of British India*" the area of distribution of *P. rotundifolia*, Wall. is given as "Temperate Himalaya; from Kashmir, alt. 11,000 ft. to Sikkim, alt. 12,000–13,000 ft." The statement is, I suspect, based upon this Kew sheet. But neither *P. rotundifolia*, Wall., nor any one of its immediate allies, is found in the West Himalaya. *P. rotundifolia*, Wall. is to our present knowledge a plant of Nepal. *P. cardiophylla*, here segregated, is a plant of S.W. Sikkim, and this is the species to which most of the *P. rotundifolia* of living collections belongs.

Primula chrysochlora, Balf. fil. et Ward. (Candelabra.)

Glabra efarinosa. Folia membranacea rosulata tenuia viridia ad 8 cm. longa ad 3 cm. lata oblonga vel oblongo-obovata obtusa margine irregulariter denticulata basi in petiolum brevissimum vaginantem attenuata subtus pallidiora glanduloso-

foveolata. Scapus robustus ad 4 dm. altus nigro-viridis umbellam terminalem plurifloram (ad 12) et verticillos inferos 3-4 inter se remotos gerens; bracteae ad 2.5 cm. longae laete virides elongato-lanceolatae acuminatae vel ligulatae apice nonnunquam dentatae; pedicelli validi mox deflexi bracteis breviores. Calyx tubuloso-campanulatus ad 7.5 mm. longus 5-costatus costis laete viridibus intervallis pallidis pergamentaceis ad medium fissus lobis triangulari-acuminatis hydathodo corneo terminatis. Corollae aureae tubus ad 1.2 cm. longus floris longistyli infundibularis, brevistyli cylindricus angustior, annulatus intus infra stamina membranaceus transverse rugosus supra crassior granuloso-puberulus, limbus granuloso-puberulus, lobi late obcordati vel subrotundati ad 8 mm. diam. emarginati. Stamina floris brevistyli antheris sub anulum insertis, longistyli basim tubi corollini versus inserta calyce inclusa et strumis corollinis annulatim separata. Ovarium ovoideum; stylus brevis calyce brevior, longus exsertus; stigma globosum.

Ex affinitate *P. helodoxae*, Balf. fil. sed farinae inopia, foliis membranaceis, pedicellis nutantibus, calyce ad medium fisso differt.

"Yunnan. Marshes near Tengyueh. Alt. 4000-5000 ft. 12th April 1913. Just coming into flower." F. K. Ward. No. 211.

This species of *Candelabra Primula* sent by Kingdon Ward, coming from the same general area as *P. helodoxa*, Balf. fil., which in appearance it recalls, has more than ordinary interest on account of the variability that is shown by the latter species. *P. chrysochlora*, Balf. fil. et Ward is a plant of very wet places, and its leaves are thin and membranous, short and broad—more so than in any form of *P. helodoxa*, Balf. fil.,—and they make a spreading rosette. There is no trace of the golden meal so prominent on the inflorescence of *P. helodoxa*, Balf. fil. The bracts and calyx are green, wonderfully bright in a dried specimen. The bracts are long, exceeding the pedicels, and have a general strap form tapering mostly to the point, but sometimes not diminishing in width, and then having a toothed apex. The absence of the meal from the calyx allows the sepaline ridges to show up as green bands in the middle of each of which runs the delicate mid-vein, and the intervals between the bands are paler with a parchment texture. The whole calyx we may call vittate, and it is very different from the calyx in *P. helodoxa*, Balf. fil. The inner parts of the flower are not markedly different from those of *P. helodoxa*.

One asks, Can this be a microform of *P. helodoxa*, Balf. fil.? Its characters as seen in the solitary sheet of specimens suffice

to distinguish it readily. If I give it a name, I do not overlook the possibility suggested.

***Primula conica*, Balf. fil. et Forrest. (Muscarioides.)**

Herba rosulata efarinosa pilosa rhizomate parvo rosulis sub anthesi gemmae squamis et foliis juvenilibus basi cinctis. Folia petiolata ad 17 cm. longa ad 3.5 cm. lata; lamina oblanceolata apice obtusa vel subrotundata deorsum in petiolum alatum vix distinctum subvaginatum in medio erubescens gradatim attenuata margine sub-erosa denticulis vel crenis paucis irregularibus obtusis vel acutis et hydathodo corneo terminatis saepe decurvis utrinque concolor pilis mollibus longis albis hirsuta subtus praecipue ad venas vestita. Scapus validus ad 30 cm. altus hirsutus efarinosus spicam conicam ad 3.5 cm. longam multifloram gerens floribus deflexis imbricatis; bracteae ligulatae obtusae basi expansae circ. 1 cm. longae virides vel apice purpurascences pilis glandulosis ciliatae deflexae externae floribus occultae supremae purpureae plus minusve erectae et ultra flores prolatae; pedicelli subnulli. Calyx obliquus suburceolatus circ. 4.5 mm. longus tenuis membranaceus extus intusque glanduloso-viscidus ad medium fissus tubo viridi deflexo lobis inaequalibus pilis longis glandulosis ciliatis posteriore maximo externo extus purpurascens rotundato 3.5 mm. lato apice truncato et eroso vel dentato postero-lateralibus rotundato-ovatis minoribus viridibus vel leviter purpureo-striatis antero-lateralibus minimis ellipticis vel late ovatis subacutis viridibus. Corolla tubuloso-infundibuliformis coerulescopurpurea deflexa 1.5 cm. longa ad faucem ampliata tubo intus albescente et minutissime glanduloso-puberulo exannulato limbi concavi disco circ. 1.5 mm. lato lobis subquadratis vel subrotundatis circ. 2.5 mm. longis emarginatis. Stamina filamentis albidis conspicuis latis antheris parvis fl. brevistyli in faucem corollae antherarum apicibus vix exsertis longistyli basim versus apicibus vix calycem excedentibus inserta. Ovarium globosum viride; stylus brevis calycem aequans pallide viridis, longus exsertus; stigma magnum discoideum margine revolutum.

Species efarinosa Sectionis Muscarioidis scapo hirsuto, bracteis calyceque pilis glandulosis ciliatis, calyce extus intusque viscido-glanduloso, corollae lobis subquadratis emarginatis valde distincta.

"Yunnan. Chungtien plateau. Lat. 27° 30' N. Alt. 11,000 ft. Open pasture by streams." Forrest, No. 12,707. July 1914.

This plant is a typical member of the Muscarioid Section and of that division of it, including *P. gracilentia*, Dunn, in which mealiness is absent, and like that species it has a very hairy scape.

The absence of meal from the flowers seems to be made up for by the development of viscidly-glandular short hairs over the calyx inside and out, and the margins of the calyx are fringed also with long glandular hairs. Concurrently the calyx is very thin and membranous. In *P. gracilentia* the calyx has a close covering of non-glandular hairs on the outside and is bare of them inside. One may say *P. gracilentia* is the nearest ally in the Section to *P. conica*. In addition to the calyx character, *P. gracilentia* is readily differentiated by the apiculate corolla-lobes. The behaviour of *P. conica* in cultivation so far suggests treatment for it not different from that of other members of the Section. The plant was introduced by Mr. Williams of Caerhays Castle through seed collected by Mr. G. Forrest, and flowered for the first time in 1916 with Messrs. Wallace of Colchester and also at Edinburgh.

Primula Cooperi, Balf. fil. (Candelabra.)

Aromatica pilosa. Folia petiolata sub anthesi ad 18 cm. longa ad 3.5 cm. lata; lamina membranacea viridis elongato-oblonga obtusa vel acuta margine irregulariter denticulata basi in petiolum aequilongum vel longiorem anguste alatum vaginantem attenuata subtus pallidior glanduloso-foveolata et glandulis minutis plurimis oblecta venis primariis ex costa media subtus prominula subpatenter adscendentibus; folia post anthesin accrescentia ad 27 cm. longa et 6 cm. lata. Scapus ad 20 cm. altus viridis umbellam terminalem plurifloram interdum verticillo infero praeditam gerens; bracteae ad 8 mm. longae lineares minutissime puberulae et nigro-punctatae; pedicelli filiformes ad 2 cm. longi minutissime puberuli virides deflexi sub fructu erecti stricti; anthopodium breve. Calyx tubulosus efarinosus opacus ad 7 mm. longus crassus extus scabriusculus 5-costatus ad trientem fissus, lobis elongato-triangularibus obtusis. Corollae aurantiacae ubique puberulae tubus crassus infundibularis 1 cm. longus supra stamina ampliatus annulo luteo prominulo instructus infra stamina rugosus, limbi concavi discus 1 mm. latus, lobis rotundatis vel oblongis ad 8 mm. longis ad 7 mm. lati subcrenulatis truncatis mucronulatis. Stamina floris brevistylis infra medium tubi corollini inserta; filamenta distincta; antherae 2 mm. longae apicibus ab annulo 4 mm. remotis calyce breviores. Ovarium globosum; stylus longus albus tubum corollae aequans; stigma apice depressum. Capsula globosa tubo calycis lobis patentibus inclusa primo operculatim dein irregulariter valvatim dehiscens. Semina parva 0.5 mm. diam. cuboidea brunnea subscrobiculata.

Species aromatica efarinosa *P. serratifoliae*, Franch. forsan

affinis, bracteis nigro-punctatis, corolla concolore inter notas alias distincta.

"Sikkim. Above Toong. Alt. 10,000 ft. Most distinct yellow colour. Never seen but here on sandy stream side. R. E. Cooper." No. 349. 25th July 1912. Also Nos. 892, 893. 16th Sept. 1913.

This plant we owe to Ronald E. Cooper, collector for Bees, Ltd. It is an interesting addition to the East Himalayan *Candelabra* Primulas. At first sight it resembles the yellow-flowered *P. obliqua*, W. W. Sm. and *P. elongata*, Watt, of Sikkim, but apart from its odour, which serves at once as a diagnostic mark, the globose operculate fruit separates it from the Section of these plants. The only other yellow-flowered *Candelabra* species of the northern area of the East Himalayas is *P. Smithiana*, Craib, a Chumbi plant, which may be readily diagnosed by the dense sulphur-yellow meal coating its calyx and inflorescence. The Khasian yellow *Candelabras* *P. proliфера*, Wall. and *P. khasiana*, Balf. fil. et W. W. Sm., both of which have no meal, have not the aromatic leaves of *P. Cooperi*, and have more delicate flower pedicels, shorter calyces, and smaller fruits. Perhaps its nearest relation amongst the yellow-flowered *Candelabras* is the Chinese *P. serratifolia*, Franch. but that species has a more Soldanelloid corolla with a central lemon-coloured strip on each petaline lobe.

Primula Craibeana, Balf. fil. et W. W. Sm. (*Sphaerocephala*.)

Rosulata rhizomate globoso parvo radicibus plurimis foliisque plurimis erectis floribus coetaneis. Folia in rosula 8-14 ad 12 cm. longa petiolata; lamina chartacea circ. 1.2 cm. lata anguste oblanceolata apice acuta vel apiculata deorsum in petiolum subaequilongum anguste alatum basi subamplexicaulem sensim attenuata margine denticulis crebris argutis subregulariter denticulata supra atroviridis sed tamen glandulis stipitatis minutis fariniferis conspersa subrugulosa costa media et venulis primariis plurimis oblique ascendentibus plus minusve sulcatis subtus luteo-farinosa favoso-reticulata venarum reti eminente. Scapus rigidus ad 40 cm. altus cum bracteis plus minusve luteo-farinosus umbellam capitatam multifloram plus minusve globosam gerens; bractee 2-4 mm. longae ovato-lanceolatae obtusae externae recurvatae, pedicelli subnulli vel ad 0.5 mm. longi; flores deflexi. Calyx circ. 6 mm. longus tenuis subcampanulatus luteo-farinosus tubo intus excepto vix ad medium fissus lobis erectis lanceolatis vel ovato-lanceolatis inaequalibus posteriore aliis majore acutiusculis. Corollae tubus membranaceus erubescens circ. 9 mm. longus 5-carinatus infra cylindricus supra stamina paulo inflatus extus aureo-farinosus intus pur-

pureus transverse tenuiter rugulosus minute annulatus, limbi concavi discus circ. 1.5 mm. latus, lobi circ. 3 mm. longi subquadrati erecti emarginati. Stamina filamentis conspicuis antheris 1.5 mm. longis connectivo purpureo in flore brevistylis ad faucem inserta antherarum apicibus vix exsertis. Ovarium ovoideum stylopodio coronatum; stylus brevis ovario brevior; stigma depresso-capitatum. Capsula oblongo-ovoidea calyce inclusa infra tenuiter crustacea supra incrassata valvulis 5 integris apice tantum dehiscentibus; placenta ovoidea stipite brevissimo. Semina atrobrunnea cuboidea vesiculosotuberculata.

Microforma *P. capitatae*, Hook. foliis anguste lanceolatis acutis supra efarinosis subtus luteo-farinosis inflorescentia globosa distinguenda.

Sikkim. Alt. 10,000–16,000 ft. J. D. Hooker.

This species was first noted in the herbarium at Kew by Mr. W. G. Craib, and he refers to it in his paper read before the Primula Conference. It differs from all other forms of the Aggregate *P. capitata*, Hook. by having yellow meal. Its nearest Indian ally is *P. lacteocapitata*, Balf. fil. et W. W. Sm. The rhizome and the form of the leaves in the two species is similar, as is also the globose inflorescence. But *P. lacteocapitata* has cream-coloured meal and is mealy on both leaf surfaces. This plant has quite yellow meal and only on the under surface. The dried specimens do not allow of a certain decision upon the colour of the petioles, but there is a suggestion of redness—one of the features of *P. lacteocapitata*. So far as I know this plant is not yet in cultivation.

Of the distribution of the species in Sikkim I cannot speak here. Two sheets of specimens in Kew Herbarium collected by Sir Joseph Hooker show the plant—mixed in each case with another species. In the Calcutta Herbarium and in that of Edinburgh are several sheets of specimens which evidently belong to the species, and these will be dealt with in an account of the whole Capitata Aggregate.

Primula crispa, Balf. fil. et W. W. Sm. (Denticulata.)

P. capitata, var. *crispa*, Hort.

P. capitata, var. *erosa*, Hort.

P. erosa, Hook. fil. in Bot. Mag. (1887), t. 6916 A. (non Wall.).

Epilosa rhizomate parvo foliis circ. 16 in rosula dispositis floribus coetaneis. Folia circ. 8 cm. longa petiolata; lamina carnosula ad 4 cm. longa ad 1.5 cm. lata oblonga vel oblanceolata vel obovata spathulata apice rotundata circumcirca erosa vel sublobulata et crispidenticulata deorsum in petiolum aequilongum vel longiorem alatum rubrum gradatim attenuata

utrinque viridis efarinosa sed tamen glandulis parvulis capitatis stipitatis fariniferis conspersa supra rugosa costa media venulisque sulcatis subtus pallidior favoso-reticulata costa venisque elevatis. Scapus ad 20 cm. altus validus cum bracteis pedicellisque aureo-farinosus umbellam capitatam parvam saepe obliquam gerens; bractee erectae anguste ovatae vel a basi lanceolatae acuminato-caudatae ad 8 mm. longae integrae vel denticulis subulatis paucis praeditae carinatae basi pulvinatim incrassatae; pedicelli ad 2 mm. longi anthopodio 0.5 mm. longo turbinato terminati. Calyx tubulosus circ. 7 mm. longus extus intusque aureo-farinosus ultra medium fissus lobis viridibus circ. 4.5 mm. longis a basi lanceolatis acutis subpatentibus aequalibus. Corollae tubus erubescens extus aureo-farinosus in flore brevistylo circ. 9 mm. longus intus plus minusve aurantiacus infra stamina tubulosus et rugulosus supra ampliatus et farinosus ad faucem aurantiaco-strumosus vix annulatus, limbi concavi extus intusque farinosi discus circ. 2 mm. latus, lobi obcordati circ. 4 mm. diam. emarginati. Stamina in flore brevistylo filamentis brevissimis antheris magnis ad 2 mm. longis apicem tubi corollini versus inserta antherarum apicibus ad os attingentibus. Ovarium viride turbinatum stylopodio lato coronatum; stylus brevis calyce multo brevior; stigma capitatum.

Species Sectionis Denticulatae; a *P. erosa*, Wall. valde diversa et foliis carnosulis crispidenticulatis petiolisque rubris scapo floribusque aureo-farinosis facile distinguenda.

Sikkim. Ningbil. Alt. 13,000 ft. W. W. Smith. No. 4209. 11th Aug. 1910.

This is the *P. erosa* of the Bot. Mag. (1887), t. 6916. It is not the true *P. erosa*, Wall. Both this and *P. erosa*, Wall. belong to the Denticulata Section, and are easily separated from *P. capitata*, Hook. fil. and its many forms and allies by the inflorescence and flower characters. It does not appear to be a species common in cultivation. Through the generosity of Mr. G. Reuthe a plant of it came to the Royal Botanic Garden, Edinburgh, and a prized gift it was, inasmuch as it enabled me to solve the problem which had previously baffled me of the identity of the plant figured in the Bot. Mag., t. 6916. The Director of Kew kindly allowed me to have for examination the dried specimen of the plant from which this figure was drawn, but I had never met with a plant in cultivation which I could match with that shown in the Bot. Mag. until I received the plant from Mr. Reuthe. There is no mistaking it. The short fleshy crisp blades of the leaf, green on both sides, and the long red petioles are in addition to its Denticulata flowers most distinctive. The

plant must not be mixed up with *P. crispata*, Balf. fil. et W. W. Sm. That is a microform of true *P. capitata*, Hook.

Only one native locality is cited here for the plant. Further examination of the rich material of primulas in the Calcutta Herbarium is required before its distribution can be ascertained.

***Primula crispata*, Balf. fil. et W. W. Sm. (Sphaerocephala.)**

P. capitata, Hort. in Garden (1879), 535, pl. ccx.

Rosulata epilosa foliis plurimis cum floribus coetaneis patentibus rhizomate crasso brevi copiose radicante. Folia membranacea circ. 10 cm. longa late petiolata; lamina ad 3.5 cm. lata anguste oblonga vel oblanceolata deorsum in petiolum alatum ad 1.5 cm. latum viridem vix ab lamina discretum basi subamplexicaulem attenuata apice rotundata vel obtusa margine eroso-denticulata denticulis hydathodo conspicuo terminatis utrinque viridis glandulis stipitatis inconspicuis fariniferis conspersa sed tamen efarinosa supra rugosa areolatim venulosa costa media venulisque primariis plurimis patulis sulcatis albidis subtus pallidior costa media venulisque primariis elevatis venarum reti ultimo favoso-reticulato. Scapus validus teres erectus ad 30 cm. altus cum bracteis pedicellisque dense albofarinosus umbellam capitata discoideam multifloram gerens; bractee infimae sub anthesi recurvatae oblongae obtusae vel subacutae integrae vel plus minusve denticulatae circ. 8 mm. longae 4 mm. latae nervo medio conspicuo supremae sub floribus inexpansis erectae subincurvatae ultra flores haud prolatae; pedicelli pallide virides ad 4 mm. longi plus minusve curvati; anthopodium turbinatum ad 2 mm. longum a calyce abstrictum. Calyx viridis ad 8 mm. longus infundibuliformis dense albo-farinosus tubo intus excepto ad medium fissus lobis aequalibus (vel posteriore paullo majore) oblongis vel ligulatis obtusis adpressis deinde subpatentibus. Corollae tubus in flore brevistylus circ. 1.2 cm. longus in longistylis circ. 1 cm. cylindricus 5-costatus membranaceus supra stamina ampliatus extus erubescens supra calycem albo-farinosus intus lilacinus vel pallide purpureus transverse rugosus ad faucem rugis lilacinis vel purpureis strumosis subannulatis notatus, limbi concavi atrovioiacei supra glandulis plus minusve fariniferis conspersi circ. 8 mm. longi discus circ. 3 mm. latus, lobi elliptici vel subrotundi vel subobcordati emarginati vel sub-bifidi circ. 5 mm. longi erecti imbricati. Stamina filamentis conspicuis purpureis cum antheris circ. 1 mm. longis purpureis in flore brevistylis ad faucem tubi corollini antherarum apicibus circ. 2 mm. ab ore remotis inserta, in longistylis basim versus supra ovarium inserta calyceque inclusa. Ovarium turbinatum vertice stylopodio incrassato coronatum;

stylus brevis ovarium vix aequans longus tubo corollino brevior ; stigma albidum late discoideum lobulatum ab ore tubi corollini circ. 2 mm. remotum.

Microforma *P. capitatae*, Hook. sed robustior et foliis utrinque efarinosis petiolisque viridibus distinguenda.

"Sikkim. Laghep. Alt. 11,000 ft. Fine showy blue among mixed herbage. Meal only on head." R. E. Cooper. No. 961. 27th Sept. 1913.

This is one of the plants that has been for long in cultivation under the name *P. capitata*, Hook. The figure in the Garden for 1879 (pl. CCX) represents it. In size of all its parts it is a little smaller than *P. Mooreana*, Balf. fil. et W. W. Sm., which it resembles somewhat in habit, but it is readily recognised as distinct from *P. Mooreana* by the absence of meal from both sides of the leaf. *P. crispa*, Balf. fil. et W. W. Sm. resembles it somewhat in the erosion of the leaf margins, but that species has leaves with narrow red petioles, and then its inflorescence is that of the *Denticulata* Section, with erect or only patent bracts, and it has golden meal. I have only cited native specimens from one locality in Sikkim. Of these there is no doubt, but I think we shall find that other specimens, particularly in the Calcutta Herbarium, belong to the species, and the area of distribution will prove to be wider than is suggested by the solitary citation here given.

Primula Dianae, Balf. fil. et Cooper. (Amethystina.)

Efarinosa epilosa rhizomate brevi radicibus erubescens foliorum rosulis sub anthesi gemmae cataphyllis ligulatis elongatis erectis erubescens plus minusve membranaceis circumcinctis. Folia glabra longe petiolata ad 12 cm. longa; lamina membranacea oblonga vel elliptico-oblonga vel elliptica ad 6 cm. longa ad 3 cm. lata apice rotundata margine subcartilaginea denticulis minutis triangularibus hydathodo conspicuo terminatis notata basim versus integra et cuneatim in petiolum attenuata utrinque fere concolor laevis costa media venisque primariis plurimis pinnatim patulis plus minusve conspicuis; petiolus ruber ad 6 cm. longus anguste alatus basi subamplexicaulis. Scapus ad 20 cm. altus pilis fariniferis infra sparsissime supra dense obtectus erubescens umbellam 3-8-florum gerens; bractee atropurpureae coriaceae involucratae parvae circ. 3 mm. longae a basi lanceolatae obtusae farinosae uninerviae extus basi subincrassatae; pedicelli atropurpurei filiformes ad 1 cm. longi farinosi subnutantes; anthopodium crassum turbinatum ad 2 mm. longum. Calyx atropurpureus extus intusque farinosus subcampanulatus ad 4 mm. longus crasse coriaceus ultra medium fissus tubo 5-angulato intervallis pallidioribus lobis oblongis

vel subovatis obtusis. Corollae atropurpureae in flore longistylis 2.2 cm. longae tubus circ. 1.2 cm. longus atropurpureus cylindricus supra stamina paulo ampliatus extus glandulosus intus erugulosus purpureo-annulatus fauce puberula, limbi discus circ. 2 mm. latus dense glandulosus, lobi oblongo-obovati circ. 8 mm. longi imbricati integri. Stamina infra medium tubi corollini inserta ultra calycem projecta filamentis conspicuis circ. 0.5 mm. longis deorsum expansis antheris flavidis connectivo fulvo circ. 2 mm. longis. Ovarium ovoideum; stylus longus filiformis tubum corollinum aequans; stigma ovoideum. Capsula globosa circ. 4 mm. diam. calyce inclusa irregulariter (?) dehiscens; placenta globosa brevissime stipitata. Semina angulata brunnea circ. 1 mm. diam. testa vesiculoso-tuberculata.

Species Sectionis Amethystinae foliis longe petiolatis valde distincta.

"Bhutan. Champa Pumthang. Alt. 12,000 ft. Herb in open turf in gaps of Abies forest." R. E. Cooper. No. 4000. 19th June 1915.

This is another interesting new *Primula* from Bhutan, helping to bind the Himalayan with the West Chinese flora. *P. Dianae* belongs to the Amethystina Section, which is typically represented in the Eastern Himalaya by the charming *P. Kingii*, Watt, and also by *P. Gageana*, Balf. fil. et W. W. Sm. From these Cooper's plant is readily distinguished by the long petiolate leaves and the corolla not velvety puberulous. The Section is more numerously represented in China by *P. amethystina*, Franch., *P. brevifolia*, G. Forrest, *P. leimonophila*, Balf. fil., *P. petrophyes*, Balf. fil., and the small *P. silaensis*, Franch. Cooper's plant takes most after *P. brevifolia*, but from all these Chinese plants, as from the Indian, the long petioled leaves at once separate it.

***Primula Duthieana*, Balf. fil. et W. W. Sm. (Nivalis.)**

Planta rhizomate brevi alabastri squamis elongatis erectis rufescentibus submembranaceis rosulam foliorum tunicatim obtegentibus. Folia ad 20 cm. longa ad 3.5 cm. lata lanceolata vel oblanceolata vel oblongo-lanceolata acuta margine subtiliter crenulata deorsum in petiolum alatum vix distinctum attenuata glabra efarinosa. Scapus folia aequans vel vix eis longior robustus superne cum bracteis pedicellisque calyceque glandulis globosis fariniferis obsitus umbellam plurifloram (ad 20) gerens; bractee ligulatae foliaceae ad 3.5 cm. longae ad 2 cm. latae acutae; pedicelli validi bracteis breviores vel longiores; anthopodium obconoideum. Calyx elongato-campanulatus viridis circ. 1 cm. longus ultra medium fissus lobis a basi lanceolatis venis plurimis percursis intus dense glanduloso-

puberulis. Corollae luteae concoloris tubus infra cylindricus supra stamina amplius in flore longistylis circ. 1.8 cm. longus in brevistylis circ. 1.4 cm. longus membranaceus erugosus annulatus annulo crenulato-lobato, limbi discus angustus vix 0.5 mm. latus puberulus, lobi oblongi vel elliptici integri ad 1 cm. longi. Stamina filamentis distinctis deorsum expansis antheris angustis circ. 2.5 mm. longis apiculatis in flore brevistylis ad faucem inserta antherarum apicibus circ. 1 mm. ab annulo remotis in longistylis infra medium antheris calyce vix brevioribus. Ovarium ovoideum stylopodio conspicuo; stylus longus tenuis tubo corollae quadrante brevior, brevis validior calyce triente brevior; stigma capitatum. Capsula cylindrica circ. 1.5 cm. longa circ. 3 mm. lata calycem haud auctum lobis intus dense luteo-farinosis dimidio excedens ab apice dentibus 5 rotundatis dehiscens; placenta columnaris brevis circ. 5 mm. longa brevissime stipitata. Semina ad 2 mm. longa nigrobrunnea complanata multiformia orbicularia vel oblonga vel fusiformia angulata semper plus minusve spongiosa.

Primulae Stuartii, Wall. affinis, bracteis longis, capsula calycem multo superante distincta.

Hazara. Bangas, Mazaffarabad. Inayat. 21st July 1897. No. 21,979a. In Herb. Kew.

Hazara. Chapri, Kagan. Inayat. 27th July 1897. No. 21,979; 25th July 1899; 28th July 1899. In Herb. Kew.

Hazara. Giti Dass, Kagan. Inayat. 23rd June 1899. In Herb. Kew.

Hazara. Musa, Muzaffarabad. 18th July 1899. In Herb. Kew.

Hazara. Nila, Kagan. Inayat. 21st July 1899. No. 21,979b. In Herb. Kew.

Hazara. Ragi bhozi, Kagan. Duthie. 23rd July 1899. In Herb. Kew.

Hazara. Uraksula, Kagan. Duthie. 25th July 1899. In Herb. Kew.

Hazara. Parchnadi, Saran Range. Inayat. 13th Aug. 1899. In Herb. Kew.

Hazara. Khunda. 22nd Aug. 1899. In Herb. Kew.

Hazara. Urni, Jabar, Saran Range. Inayat. 24th Aug. 1899. In Herb. Kew.

This plant is a dwarf *P. Stuartii*, Wall., but recognisable at sight in dried specimens at least by the long bracts of the inflorescence and then in fruit by the longer and broader capsule with larger seeds. The specimens of it I have examined are from Duthie's collection now at Kew. They have been abun-

dantly poisoned, so much so that layers of crystals of corrosive sublimate are to be found on the surface of the capsule under the calyx lobes. This poisoning may account for the absence of actual meal—excepting on the inside of the calyx lobes in fruit—on all the specimens, although the capitate glands from which meal comes are abundant. In nature the plant is, I expect, covered more or less with yellow meal.

We know it only as a North-West Himalayan form, but from none of the localities recorded for *P. Stuartii*.

Primula eburnea, Balf. fil. et Cooper. (Soldanelloides.)

Rosulata rhizomate minuto foliisque membranaceis paucis floribus coetaneis. Folia petiolata sub anthesi magnitudine variabilia nunc 5 cm. longa nunc ad 18 cm.; lamina in foliis minoribus elliptica vel oblongo-elliptica 3 cm. longa 1.5 cm. lata in majoribus ad 9 cm. longa ad 3.5 cm. lata in omnibus apice rotundata vel obtusa margine denticulata in foliis maximis nonnunquam paulo lobulata lobulis denticulatis denticulis triangularibus minute glanduloso-ciliatis semper venulae mediae apiculo prolato terminatis basi in petiolum aequilongum vel longiorem paulo alatum basique vaginantem longe cuneatim attenuata utrinque concolor pallide viridis glandulis stipitatis plus minusve viscida costa media subtus prominula venisque primariis acute adscendentibus et superne flabellatim divaricatis. Scapus tenuis ad 20 cm. altus albo-farinosus capitulum globosum multiflorum floribus deflexis gerens; bracteae parvae circ. 6 mm. longae vix 1 mm. latae a basi ligulatae acutiusculae; pedicelli nulli. Calyx magnus laete viridis membranaceus late crateriformis ad 9 mm. longus extus intusque glandulis fariniferis stipitatis obtectus ad trientem fissus lobis inaequalibus patentibus latis subrotundatis vel late triangularibus vel oblongo-ovatis semper denticulatis obtusis vel acutis margine glanduloso-ciliatis. Corollae floris longistyli magnae circ. 2 cm. longae eburneae extus intusque glandulis stipitatis obtectae tubus circ. 1 cm. longus basi circum ovarium globosus firmus supra infundibuliformis erugulosus exannulatus tenuiter membranaceus obliquus, limbi ampliati discus concavus circ. 4 mm. latus in lobos circ. 6 mm. longos et 1 cm. latos semi-lunatos fimbriatos expansus. Stamina in flore longistylo basim tubi corollini versus supra ovarium inserta filamentis brevibus antheris circ. 2 mm. longis connectivo fulvo. Ovarium globosum stylopodio punctulato coronatum; stylus longus tenuis tubum corollinum aequans; stigma discoideum lobulatum.

Species ex affinitate *P. Reidii*, Duthie foliis evillosis, bracteis angustis, corollae lobis tenuioribus fimbriatis distinguenda.

"Bhutan. Narim Thang Kurted. Alt. 14,000 ft. Flowers

white, reflexed corolla. Growing among peaty turf and glacial debris by streams." R. E. Cooper. No. 4236. 31st July 1915.

The charming *P. Reidii*, Duthie is a plant of the N.W. Himalaya, with, as far as we know, limited distribution there. In *P. eburnea*, Balf. fil. et Cooper we have a similar plant from the Eastern end of the Himalayas—no less charming. The fact of distribution is most interesting. *P. Reidii* is the only West Himalayan species known of the Section Soldanelloides. The other Indian species, *P. sapphirina*, Hook. fil., *P. soldanelloides*, Watt, *P. Wattii*, King, and *P. uniflora*, Klatt, are all Sikkim plants; and it is remarkable that from Bhutan we should now get not merely one of the Soldanelloides—that we might expect for the Section has several representatives further East in China—but a form of the Section which one might be excused for mistaking at first glance for *P. Reidii* itself. There are no seeds on Mr. Cooper's specimens, but one hopes there may be some in the seed collection he has sent home. The plant may contest with *P. Reidii* its place in our collections. Mr. Cooper says nothing of mealiness in the flower, and I am unable from the dried material to describe with certainty the extent to which the flowers are mealy, for in these Soldanelloid forms the meal is easily removed in process of preservation. Certain is it that glands which may be meal glands occur all over the flower.

Primula Farreriana, Balf. fil. (Nivalis.)

Robusta farinosa epilosa rhizomate parvo floribus foliisque coaetaneis. Folia spathulata longe petiolata ad 2.2 dm. longa rosulata sub anthesi squamis alabastri haud cincta; lamina ad 10 cm. longa ad 4 cm. lata oblongo-elliptica vel lanceolata vel elliptica apice obtusa vel subacuta margine obtuse et irregulariter denticulata denticulis hydathodo parvo terminatis basi gradatim vel plus minusve abrupte in petiolum latum (ad 1.2 cm.) tenuiter membranaceum vaginantem plus minusve subterraneum attenuata supra claro-viridis pilis brevibus albidis conspersa (costa media lata plana) infra dense albo-farinosa (costa media lata leviter prominula plus minusve excepta) venis primariis plurimis pinnatim ascendentibus venulis ultimis plurimis intricato-anastomosantibus. Scapus validus ad 24 cm. altus praesertim apicem versus plus minusve albo-farinosus umbellam 4-6-floram gerens; bracteae plus minusve albo-farinosae circ. 1.5 cm. longae circ. 1 mm. latae lineares acutae basi in vaginam latam haud gibbosam abrupte expansae; pedicelli dense albo-farinosi validi bracteis paullo breviores vel eas aequantes in anthopodium conspicuum gradatim expansi.

Calyx circ. 1.2 cm. longus atropurpureus cylindricus extus glandulis fariniferis puberulus farinaque alba conspersus fere ad basim fissus lobis ad 1 cm. longis circ. 2.5 mm. latis elongato-oblongis acutis hydathodo terminatis trinerviis intus dense albo-farinosis. Corollae tubus atropurpureus cylindricus supra stamina paullo ampliatus circ. 1.4 cm. longus in floribus heteromorphis ambobus extus glaber intus supra stamina granulosus annulatus annulo atropurpureo conspicuo 5-lobato, limbi discus circ. 2 mm. latus intus atropurpureus extus albidus plus minusve farinosus, lobi pallidiores obcordati circ. 1 cm. longi et lati apice emarginati in sinu mucronati. Stamina filamentis conspicuis fere 1 mm. longis antheris magnis circ. 2.75 mm. longis in flore brevistylis ad os tubi corollini antherarum apicibus anulum attingentibus in flore longistylis medium versus inserta calyce multo breviora. Ovarium globosum; stylus brevis calyce dimidio brevior, longus calycem subaequans; stigma parvum cylindricum.

Species Sectionis Nivalis (sensu lato) ab omnibus foliorum forma indumentoque recedens.

"Kansu. Ta-Tung Alps. Dark cold and damp gullies or tight cliff crevices in shade on calcareous or non-calcareous rock from 12,000–15,000 ft. Very sweet." Farrer and Purdom. F. 560. *Primula* No. 29. June–July 1915.

A beautiful species by which to commemorate the enterprise and endeavour of its name-father. I could have wished that the *Primula* so named had been other than one of the *Nivalis* Section, the members of which have hitherto proved shy in cultivation. It seems, however, that these *Nivalis* forms probably want rich feeding. Dr. M'Watt of Duns has had great success with *P. Parryi*, Gray planted in a rose border, and, following him, I have planted several of the section in like quarters and so far with success in the way of foliage. Certainly if we can hit off the right method for growing *P. Farreriana*, the plant will be a noble addition to our cultivated *Primulas*.

***Primula Gammieana*, King, ex sched. in Herb. Calc. (Sonchifolia?)**

P. obtusifolia, Royle var. *Roylei*, Hook. fil. in Flora Brit. Ind. iii (1882), 489 (ex parte); Watt in Journ. Linn. Soc. xx (1882), 8 (ex parte).

P. Griffithii, Pax in Eng. Monogr. Primul. (1905), 118 (ex parte).

Epilosa farinosa rhizomate parvo radicibus succulentis fibrillis filiformibus copiose suffulto et ad collum squamis paucis membranaceis elongatis primo foliorum petiolos vagina-

tim circumvolutis mox marcidis praedito. Folia petiolata ad 14 cm. longa (sub fructu multo accrescentia); lamina membranacea oblonga vel elliptica ad 5 cm. longa ad 2 cm. lata obtusa laevis apice nunc rotundata margine regulariter denticulata denticulis hydathodo corneo terminatis deorsum in petiolum alatum vaginantem duplo- vel triplo-longiorem attenuata subtus vix pallidior utrinque glandulis fariniferis oblecta sed plerumque in speciminibus siccis efarinosa et glandulis rubris quasi punctiformibus notata costa media lata erubescente utrinque elevata et venulis primariis impressis percurta. Scapus ad 15 cm. longus (sub fructu multo elongatus) folia vix vel paullo superans validus infra glaber superne luteo-farinosus umbellam ad 10-floram gerens; bracteae atropurpureae plus minusve luteo-farinosae a basi lata lineari-subulatae ad 1 cm. longae pedicellis breviores; pedicelli filiformes flexiles patentes vel subnutantes luteo-farinosi ad 1.3 cm. longi infra fructum multo incrassati; anthopodium turbinatum conspicuum. Calyx subpoculiformis crassus atropurpureus extus intusque plus minusve luteo-farinosus ad 6 mm. longus circ. ad medium fissus lobis elongato-triangularibus vel oblongis obtusis subdivergentibus ascendentibus nervis nigris sine hydathodo conspicuo copiose percursis. Corollae crassiusculae intense purpureae tubus cylindrico-infundibularis fl. brevistylis circ. 1.2 cm. fl. longistylis circ. 1 cm. longus extus glaber supra stamina amplius annulo angusto purpureo instructus intus infra stamina transverse rugosus faucem versus plus minusve puberulus, limbi concavi discus 1-3 mm. latus puberulus, lobi plani lati ad 1.2 cm. lati et longi obovati vel rotundati emarginati vel retusi. Stamina filamentis conspicuis purpureis circ. 0.5 mm. longis basi latis lateraliter strumis corollinis quasi annulum formantibus conjunctis antheris circ. 1.5 mm. longis connectivo purpureo fl. longistylis fere ad medium tubi corollini vel infra inserta antherarum apicibus ab annulo circ. 4 mm. remotis calycem aequantibus, brevistylis prope os corollae inserta apicibus vix exsertis. Ovarium obturbatum apice conoideum; stylus atropurpureus longus vix exsertus brevis calyce vix brevior; stigma capitatum lobatum. Capsula discoidea circ. 6-7 mm. lata vertice convexa quoad dimidium inferius calyce aucto lignoso-coriaceo cupuliformi lobis patentibus inclusa apicem pedicelli conspicue incrassati stricti divaricati coronans irregulariter operculatim dehiscens. Semina cuboidea brunnea spongiosa areolata circ. 3.5 mm. diam. columnam placentalem convexam validam lignoso-stipitatam insternentia et ab ea gradatim cadentia.

Microforma *P. Roylei*, Balf. fil. et W. W. Sm. foliorum rosulis squamis longis membranaceis vaginantibus efarinosis

circumcinctis, lamina oblonga laevi, petiolo elongato lamina multo longiore, fructu et seminibus majoribus recognoscenda.

Sikkim. Lachen, 11,000–15,000 ft. Hooker. Nos. 10 and 15. June, July 1849. Fl. deep purple like *Auricula*. In Herb. Calc. et Kew. Quite typical.

Nattong (Gnatong). King's Collector. No. 4342. 12th July 1877. Flowers purple; No. 4363. 13th July 1877. Flowers dark purple. In Herb. Calc.

Above Phemgaroo, 12,000 ft. Pantling. May 1885. Flowers deep purple. King's type. (Nos. 46,474, 46,519 in Herb. Clarke.) In Herb. Calc. et Kew.

Hill behind Tangu bungalow, 15,200 ft. Younghusband. 5th July 1903. In Herb. Calc. et Kew.

Yatung. Hobson. 1897. In Herb. Kew.

Sir George King recognised this species, and gave it its name on the sheets of the Calcutta Herbarium, but did not publish a description. Sir George Watt cites* the name suggesting the plant is no more than a variety of *P. Kingii*, Watt, but additional knowledge does not support this view. *P. Gammieana*, King is an Eastern Sikkim and Tibetan species having its nearest alliance in *P. Roylei*, Balf. fil. et W. W. Sm., a Western Sikkim and Nepal plant. In its type-form marked by King it is readily recognised by the long sheathing membranous scales below the leaf-rosette, by the long petioles bearing many elliptic blades, by the stout pedicels thickening much below the calyx in fruit, by the woody stipe of the placenta, and by the large seeds. In all these characters it differs from *P. Roylei*. Hooker's Lachen plants Nos. 10 and 15 are also very typical—very different from *P. Griffithii*, Watt, with which Pax joins them. *P. Gammieana*, like *P. Roylei*, is a purple-flowered species formerly referred to *P. obtusifolia*, Royle, which is, however, a N.W. Himalayan plant of the Nivalis Section, whilst *P. Gammieana* and its ally *P. Roylei* have characters of the *Sonchifolia* and *Petiolaris* groups. So far as I know, it has not come into cultivation. Only a few undoubted specimens of *P. Gammieana* in herbaria are cited here. But in the Calcutta and other herbaria are many specimens resembling it, which must be dealt with at another time. Particular attention may be directed to specimens from Eumtso La and Zemu. Dried material is not very satisfactory for the diagnosis of many of these nearly related forms, and the limits amongst the forms with which *P. Gammieana* is connected can only be determined by careful study of living plants—on the field if possible. Indian botanists in West Sikkim may find it worth while to take up the investigation.

* Watt, On Indian Primulas in Journ. R.H.S., xxix (1904), 300, 314, 319.

Primula helodoxa, Balf. fil. (Candelabra.)

Epilosa efarinosa inflorescentia calyceque exceptis. Folia varia nunc rosulata subpatula cinerea opaca circa 10–12 cm. longa 2–3 cm. lata oblanceolata vel oblongo-obovata vel lanceolata denticulata obtusa in petiolum alatum vaginantem lamina dimidio breviora attenuata costa media lata albida vel erubescens venulisque primariis fere transverse patulis non prominulis percursa, nunc erecta viridia ad 35 cm. longa 7 cm. lata tenuia oblanceolata vel obovato-lanceolata apice rotundata in triente supremo denticulata caeteroquin integra deorsum gradatim attenuata petiolum alatum longum vaginantem formantia costa media albida latissima venisque primariis acute ascendentibus haud prominulis percursa. Scapus ad 6 dm. altus vel altior robustus umbellam terminalem et verticillos 4–5 inter se remotos plurifloros (ad 20) gerens ad nodos aureo-farinosus; bractee variae nunc ad 7 mm. longae anguste lanceolatae acuminatae basi subconnatae pedicellis dimidio breviores nunc longissimae pedicellis vel etiam floribus longiores basi cucullatim vaginantes superne loriformes subfoliaceae margine plus minusve crenato-undulatae semper plus minusve aureo-farinosae; pedicelli ad 3.5 cm. longi graciles stricti patentes sub fructu erecti plus minusve aureo-farinosi; anthopodium obconicum distinctum. Calyx parvus 3–5 mm. longus poculiformis extus densissime aureo-farinosus costis 5 striatus intus efarinosus breviter (vix ad trientem) fissus lobis subpatentibus triangularibus acutis minutissime membranaceo-fimbriatis hydathodo corneo terminatis. Corollae aureae tubus ad 1.4 cm. longus membranaceus annulatus lobis annuli inaequalibus intus leviter transverse rugosus, limbus granulosus, lobi ad 8 mm. longi ad 6 mm. lati obovati integri leviter retuso-truncati. Antherae floris brevistylis ex ore tubi corollini vix exsertae, stamina longistylis fere ad basim inserta anulum interstaminalem inconspicuum formantia antherarum apicibus 8 mm. ab annulo remotis. Ovarium globosum; stylus brevis calycem paullo superans, longus ad anulum attingens vel subexsertus. Capsula globosa calycis lobis adpressis inclusa stylopodio incrassato 5-areolato margine crenato coronata primo circumscissim dein valvis 5 dehiscens. Semina nigro-brunnea irregulariter angulata scrobiculata.

Species *P. Smithianae*, Craib himalayensi orientali affinis sed robustior.

"Yunnan. Hills west of Tengyueh. Alt. 5600–6000 ft. Lat. 25° N. Plant of 1–2½ ft. Flowers bright golden-yellow, fragrant. Marshy meadows." G. Forrest. No. 7561. May 1912. In Herb. Edin.

Yunnan. G. Forrest. No. 9802. March 1913. In Herb. Edin.

"Yunnan. Hills N.W. of Tengyueh. Alt. 6000 ft. Lat. 25° 10' N." G. Forrest. No. 11,904. April 1913. In Herb. Edin.

"Upper Burma. Feng-shui-ling Pass. 8000 ft. On open or shady banks by streams, or in marshes, on fallen tree trunks, etc. 5th June 1914. Flowers sulphur-yellow, pendent. Attains a height of 1½–2½ ft. Flowers May and June." F. K. Ward. No. 1635. In Herb. Edin.

This grand species is now in cultivation through seeds sent by George Forrest to Mr. J. C. Williams of Caerhays Castle. Seedlings have been raised in abundance. It closely resembles the East Himalayan *P. Smithiana*, Craib, which is altogether a smaller plant; but the two plants will, I think, when we know more of them, prove to be geographical microforms of one aggregate.

Type specimens sent by Forrest show that the plant is variable both in foliage and in the bracts. The most of the plants under number 7561 have the smaller rosulate leaves described above, and also the small bracts much shorter than the flower pedicels. The later specimens under Nos. 9802 and 11,904 have most of them the longer leaves and the longer bracts far exceeding the pedicels, and becoming more or less foliaceous. Could one have correlated without question the leaf and bract form there might have been grounds for making a distinction between the two forms, but I do not find there is a constant association of short rosulate leaves with short bracts and long leaves with large foliaceous bracts, or the opposite. The former holds more frequently than does the latter. In the flowers I have discovered no constant difference between the two forms, although there are observable minor distinctions of size and relative length of parts. Upon the evidence before me I must unite all the plants under one specific name without making distinction of a variety, leaving the question of possible segregation for decision after more specimens have been obtained and the plants have been in cultivation.

That the plant will be an acquisition to our gardens one feels assured from the specimens Forrest has sent home. One specimen is remarkable because it shows what I have not seen in any other Candelabra Primula—a compound umbel of flowers ending the scape and umbels and compound umbels upon the lateral branches of the lower whorls of the inflorescence. A plant which "sports" in this fashion in nature, and with the bracteal variations I have described above, may be expected to show as great or greater variation under cultivation leading it along desired lines. It flowered in cultivation with Mr. Williams of Caerhays Castle in 1915, and also at Edinburgh.

Primula hylophila, Balf. fil. et Farrer. (Davidi.)

Perennis rhizomate brevi radicibus tenuibus multi-ramosis; rosula foliorum sub anthesi squamis paleaceis pallide stramineis explanatis cincta. Folia petiolata ad 9 cm. longa; lamina membranacea ad 7 cm. longa ad 4 cm. lata elliptica vel oblongo-elliptica apice rotundata margine eroso-denticulata denticulis hyalathodo corneo apiculatis utrinque glandulis copiose notata et sparsim pulverulenta subtus pallidior subnitida deorsum plus minusve abrupte in petiolum brevem ad 2 cm. longum vix vaginantem attenuata. Scapus brevis tenuis ad 6 cm. longus cum bracteis pedicellisque sparsim glandulis globosis subacuminatus umbellam ad 8-floram gerens sub fructu accrescens; bractee virides ad 7 mm. longae a basi lata egibbosa acuminatae; pedicelli ad 1.5 cm. longi stricti divaricati; anthopodium obconoidum conspicuum. Flos haud fragrans. Calyx poculiformis ad 8 mm. longus extus sparsim pulverulentus ultra medium fissus tubo flavido-viridi ad apicem constricto lobis latis imbricatis subpatentibus ovatis vel oblongo-ovatis subacuminatis nonnunquam denticulatis margine minute ciliatis laete viridibus extus intusque sparsim pulverulentis. Corollae lilacino-roseae tubus pallidior membranaceus in flore longistylus circ. 1 cm. longus infra stamina cylindricus supra amplius extus glaber intus erugosus puberulus annulatus annulo 10-lobato lobis majoribus 5 antipetalis minoribus interpetalis, limbi plani discus circ. 1 mm. latus minute puberulus, lobi magni ad 1 cm. longi ad 8 mm. lati obcordati apice anguste bifidi segmentis rotundatis nonnunquam fimbriatis. Stamina filamentis minutissimis antheris latis circ. 2 mm. longis exapiculatis in flore longistylus paulo infra medium tubi corollini inserta calyceque breviora. Ovarium subdiscoideum; stylus longus stigmate obovoideo lobulato exserto. Capsula ad apicem pedicelli claviformis incrassati (Farrer) discoidea calycis tubo (segmentis auctis crassiusculis radiatim patentibus) inclusa operculatim dehiscens; placenta pulvinato-discoidea seminibus ex toto obtecta.

Species Sectionis Davidi bene distincta.

"Kansu. Very abundant in all the alpine forests in rich loam and on rotten trunks not in dense shade. From Chago to Thunder-crown above Siku. A most lovely plant. Query section Davidi? 7000-9000 ft. Early April-May." Farrer and Purdom. F. 38. P. No. 1. In Herb. Edin.

Of this species Mr. Farrer writes:—"Primula No. 1. Clump perfectly powderless and glabrous, presenting an astonishing general resemblance to that of *P. vulgaris* in precisely the same situations, by woodland path-sides and in the lighter woodland glades. Leaves about $2\frac{1}{2}$ - $3\frac{1}{2}$ inches long, oval obovate, drawing down to a \pm short petiole, conspicuously midribbed and veined

beneath, crinkled and lettuce-like in texture, deeply and sharply erose-dentate, clothed on the upper surface in a very minute and dense coating of glands, microscopically velvety on inspection. Scape \pm = the leaves, stout, lengthening and stoutening in fruit; bracts very narrow and acute, about 6 mm. long. Pedicels erect and graceful, about $\frac{3}{4}$ of an inch, stiffening but not lengthening in fruit, and thickening into a straight, fat trumpet in a way suggestive of the *Davidi* group. Flowers from 2-8 in a wide lax umbel; calyx-lobes not = $\frac{1}{2}$ the calyx, broadly oval-pointed, sometimes faintly cut into two or three teeth, at first standing only slightly away from the tube, but then widely apart, enlarging, broadening, and thickening remarkably in fruit—as in *And. maxima*. Corolla-tube white and straight, about twice the length of the calyx, widening suddenly at the throat, with a slight constriction above in the mouth, where, at the base of each lobe, it ends in a bilobed white ray, with a greenish tinge below. Flowers $\frac{3}{4}$ inch or more, flat: lobes \pm broadly heart-shaped, lilac-rose, emarginate, scentless. Capsule a flattened orb, from which stand out and above the fattened calyx lobes: seed borne on a cushion-disk (?)."

"General in the situations indicated, light woodland, cool gorges, etc., in the forest zone of the Siku district, Siku, Satanee, Chago, Ga-hoba. Sometimes in limestone loose silt in deep cañons: very prolific on rotten fallen tree-trunks, 7000-9000 ft., flowering in April and May."

The plant is, as Mr. Farrer suggests, one of the *Davidi* Section. We know little of this section. It includes some beautiful species, and none are now in cultivation. A plant was obtained by Veitch about 1906 from seed collected by Wilson, and was introduced as *P. ovalifolia*, Franch., one of this section. It was figured in the *Gardeners' Chronicle*. It died out in cultivation. I am not at all sure that Veitch's plant was true *P. ovalifolia*, Franch. More than one plant appears under the name in herbaria, as happens also in the case of *P. Davidi*, Franch. I hope ere long to be able to study the species of the alliance more fully. Meanwhile I may recall that neither *P. Davidi* nor *P. ovalifolia* has near relationship with the suffruticose species *P. bracteata*, Franch., *P. bullata*, Franch., and *P. Henrici*, Franch., with which Pax unites them in his section *Bullatae*.* The Section *Davidi* in which I place them has close connection with Sections *Petiolaris* and *Sonchifolia*—the three showing a characteristic enlargement of the scape and pedicels in fruit ripening, and for the fruit itself

* See *Primulas of the Bullate Section* in *Trans. Bot. Soc. Edin.* xxvi (1912-13), 188.

a discoid operculate capsule occupied by a broad convex placenta upon which the seeds lie.

Primula ianthina, Balf. fil. et Cave. (Candelabra.)

Elata epilosa inflorescentia calyceque sulphureo-farinosis. Folia ad 25 cm. longa ad 5 cm. lata oblonga oblanceolata apice rotundata margine venarum hydathodis denticulata deorsum in petiolum alatum loriformem vaginantem sensim attenuata utrinque glanduloso-foveolata subtus pallidiora et secretionem flavam glandulosa plus minusve incrustata. Scapus ad 60 cm. altus robustus ad nodos sulphureo-farinosus umbellam plurifloram et 1-2 verticillos inferos gerens; bracteae ad 7 cm. longae sub fructu auctae, a basi lata anguste lanceolatae acuminatae sulphureo-farinosae; pedicelli ad 1.2 cm. longi sub fructu aucti stricti plus minusve sulphureo-farinosi; anthopodium turbيناتum conspicuum. Calyx cupulari-campanulatus 5-costatus ad 5 cm. longus extus dense sulphureo-farinosus intus tubo efarinoso lobisque sparsim farinosis ad medium fissus lobis triangulari-deltaideis acuminatis hydathodo corneo terminatis costa media prominula. Corollae violaceae in flore longistylis tubus 1 cm. longus a staminum insertionem infundibuliformis extus glaber intus annulatus fauce puberulus, limbi discus 2 mm. latus puberulus, lobi obcordati vel rotundati ad 1 cm. diam. emarginati nunc mucronati. Stamina in flore longistylis basim tubi corollini versus supra ovarium inserta, filamentis conspicuis deorsum in anulum lobatum interstaminalem expansis, antheris ovoideis calyce inclusis. Ovarium globosum; stylus longus exsertus; stigma discoideum. Capsula ovoideo-globosa efarinosa brunnea stylopodio incrassato valvatim sectili et lobulato coronata. Semina (? matura) nigricantia.

P. Smithianae, Craib verosimilis floribus violaceis differt.

Sikkim. Sandakphu. 11,500 ft. Cave. 29th July 1914. In Herb. Edin.

An interesting plant which we know only in a single specimen collected by Mr. Cave. It is the only violet-flowered Candelabra Primula as yet found in Sikkim, and is quite unlike any of the other violet or purple-flowered species.

In the Calcutta Herbarium are three sheets of a Primula in fruit, with the label:—"Primula prolifera, Wall. Sikkim. Bhik Bhanjan. Alt. 10,000 ft. Seed Collectors. No. 11,951. Oct. 1898." These are not Wallich's plant. They have abundance of yellow meal upon the fruiting calyx, and in this resemble the Sikkim *P. Smithiana*, Craib and *P. ianthina*. There are no flowers. The fruit characters are not those of *P. Smithiana*, but those of *P. ianthina*, and the foliage is also that of the latter species, and Bhik Bhanjan

being on the west side of Sikkim, as is Sandakphu, I have little hesitation in identifying the specimens from the two localities as of the same species *P. ianthina*. I hope collectors will look for the plant, which ought to have some merit as a cultivated form.

***Primula khasiana*, Balf. fil. et W. W. Sm. (Candelabra.)**

Efarinosa epilosa foliis plurimis rosulatis. Folia ad 25 cm. longa ad 3 cm. lata lanceolata acuta margine leviter denticulata deorsum in petiolum late alatum vaginantem a lamina vix distinctum paullo attenuata utrinque saccis tanniniferis in siccitate brunneo-punctata venis primariis e costa media plus minusve acute adscendentibus. Scapus elatus robustus umbellam plurifloram terminalem et verticillos inferos 1-2 gerens; bracteae longissimae pedicellis et floribus longiores angustae loriformes submembranaceae saepe undulatae vel crenatae et ad apicem subfoliatim expansae; pedicelli capilliformes erecti ad 1.5 cm. longi; anthopodium turbinatum. Calyx tubuloso-campanulatus ad 6 mm. longus vix ad medium fissus lobis lanceolato-acuminatis hydathodo corneo terminatis. Corollae tubus subventricosus ore constricto ad 1 cm. longus intus prominenter transverse rugosus et puberulus annulatus lobulis annuli 10 magnis per paria antipetalis, limbi patuli discus 1.5 mm. latus puberulus, lobi obovati lati bilobulati. Stamina in flore longistylis supra basim tubi corollini 2 mm. inserta filamentis deorsum expansis annulum interstaminalem formantibus, in brevistylis supra medium tubi corollini inserta filamentis longis quam antherae dimidio brevioribus, antheris annulum fere attingentibus, annulo interstaminali deficiente. Ovarium globosum; stylus brevis calyce brevior, longus fere tubum corollae aequans; stigma oblongum.

A *P. prolifera*, Wall. foliorum forma et venatione, bracteis longissimis, calyce corollaeque majore, staminum insertionem recedit.

Khasia. S.C. 1850. In Herb. Calc.

Khasia Hills. Native collectors of Bot. Garden, Calcutta. In Herb. Edin. et Herb. Calc.

This is a second Candelabra *Primula* from Khasia. It has been confused with *P. prolifera*, Wall. Sir George King has evidently suspected this identification of the specimen in the Calcutta Herbarium, and has written, "The flower of *P. prolifera* is yellow; these appear to have been purple." Were this so, we should have an easily observed diagnostic mark, but yellow-flowered Himalayan *Primulas* in several cases lose altogether the yellow tint when dried—*P. prolifera* is a case in point—and it would be rash to assume purple for the flower colour of *P. khasiana*. Other distinctive marks

there are in the foliage and in the inflorescence and flower, and the specific name is justified.

In the first place, it is a much more foliated plant than is *P. prolifera*. Its rosette has a dozen and more of leaves. No specimen of *P. prolifera* shows more than five leaves. In the form of leaf and in the venation *P. khasiana* is very different from *P. prolifera*. The leaves are fairly typically lanceolate, tapering to a point, and downwards are narrowed but slightly into a broad hardly distinct petiole, whereas in *P. prolifera* they are oblanceolate or obovate spatulate, have a rounded apex, and conspicuously taper downwards into a narrowly winged long petiole. The primary veins which in *P. prolifera* come off from the midrib at about a right angle, and spread patulously outwards, in *P. khasiana* diverge from the midrib ascendingly forming an acute angle with it. The bracts are distinctive. In *P. prolifera* they are linear-lanceolate barely half the length of the pedicels; here in *P. khasiana* they exceed the pedicel and flower together, and moreover are strap-shaped often foliaceous with margins undulate. Wallich had seen a plant showing this character of the bracts in the lowermost whorl of flowers, and he regarded it as a deformed state of the ordinary bract condition in *P. prolifera*. But the plants we have in which it appears have all the other characters to which I am referring separating them from *P. prolifera*, and in no preserved specimen of true *P. prolifera* do I see an indication of the character. The flowers themselves are altogether much larger than in *P. prolifera*, the calyx at least a third larger and with longer lobes, the whole quite half the length of the wide corolla tube. In *P. prolifera* the calyx is about one-third of the length of the narrower corolla tube. The annulus in *P. khasiana* is much larger than in *P. prolifera*, and the inside of the tube is conspicuously rugose and puberulous, characters not seen in the flowers of *P. prolifera* which have been examined. The stamens of the long-styled flower in *P. khasiana* are inserted higher up the corolla tube than in *P. prolifera*, and their interposed annulus is also much larger. In the short-styled flower the stamens are nearer the mouth of the corolla in *P. khasiana* than in *P. prolifera*. The short style is longer in *P. khasiana*.

Taking all these characters, the specimens available indicate a form in *P. khasiana* distinct from *P. prolifera*—to what degree further investigation must decide. It is to be hoped that exploring collectors will soon obtain material sufficient to enable us to decide. Let me here say for the benefit of collectors that they should bear in mind Sir George King's suggestion that the flower colour may not be yellow as it is in *P. prolifera*.

Primula lacteocapitata, Balf. fil. et W. W. Sm. (Sphaerocephala.)

Planta rosulata farinosa epilosa rosula dense multifoliata foliis erectis rhizomate crasso brevi subgloboso reliquiis foliorum pristinorum coronato radices plurimas emittente. Folia petiolata sub anthesi ad 12 cm. longa deinde accrescentia; lamina circ. 9 cm. longa a petiolo vix distincta circ. 1.5 cm. lata anguste oblanceolata apice acuta nunc apiculata margine undulata recurvata dentibus angustis subaequalibus triangularibus hydathodo conspicuo terminatis irregulariter denticulata basi in petiolum sensim longe attenuata supra viridis opaca (costa media pallidiore subsulcata lateribus subrugulosis) glandulis stipitatis fariniferis conspersa et plus minusve farinosa, subtus dense eburneo-farinosa costa media elevata plus minusve excepta inter venulas acute adscendentes elevatas excavata subfavosa; petiolus circ. 3 cm. longus anguste alatus farinosus basi expansus laete ruber. Scapus circ. 30 cm. altus erectus rigidus eburneo-farinosus umbellam capitata globosam multifloram floribus plus minusve deflexis gerens; bractee intense farinosae basales triangulares vel acuminatae vel late oblongae obtusae vel subquadratae apice irregulariter denticulatae circ. 5 mm. longae ad 3 mm. latae auriculatae superiores ovatae vel subligulatae; pedicelli brevissimi vix 0.5 mm. longi. Calyx circ. 6 mm. longus intense farinosus subcampanulatus ad medium fissus lobis subaequalibus ovatis acutis vel obtusis integris vel denticulatis. Corolla dense farinosa tubulosa, tubus crassus extus erubescens striatus in flore longistylus circ. 1 cm. longus supra stamina abrupte ampliatus intus transverse rugosus ad faucem purpureo-annulatus lobulis 10 subaequalibus, limbi concavi erecti discus circ. 1 mm. latus, lobi atropurpurei subquadrati circ. 4 mm. longi emarginati. Stamina in flore longistylus supra calycem et medium tubi corollini inserta filamentis conspicuis atropurpureis antheris purpureis apicibus circ. 1 mm. ab annulo remotis. Ovarium magnum globosum; stylus longus tubum corollae aequans; stigma magnum discoideum recurvatum.

Microforma bene distincta *P. capitatae*, Hook. foliis rubrovaginatis subtus eburneo-farinosis supra farina conspersis, umbella globosa, corolla minore facile dignoscenda.

East Himalaya. Below Mome Samdong, 13,000 ft.; on screes, leaves mealy below. R. E. Cooper. No. 428. 2nd Aug. 1913. In Herb. Edin.

East Himalaya. Near Lachen, Sikkim. 8800 ft. R. E. Cooper. No. 438. 8th Aug. 1913. In Herb. Edin.

P. lacteocapitata is one of several forms which have hitherto been confused with *P. capitata*, Hook. This is not surprising,

for the dried material which botanists have had for study has not been ample, is unless exceptionally well preserved difficult to analyse, and indeed in the drying process loses certain distinctive characters. The plant has been in cultivation at Edinburgh for several years, raised from seed presented by the Calcutta Garden under the name *P. capitata*. It has flowered recently and the living plants have furnished the evidence which makes clear its distinctness from *P. capitata*. The vegetative parts furnish a distinguishing mark in the bright red sheath at the base of the leaves and in the creamy farina on the under side of the leaf. The upper surface too never is densely farinose, only slightly sprinkled with meal. The inflorescence is much smaller, quite globose, and the flowers have a much smaller corolla. Protected from winter damp the plant thrives from year to year, but is apt to die off during the winter if exposed to wet. It is an interesting member of the series of forms that range around *P. capitata*. Only two sets of collectors' specimens are cited above. Of their identity there is certainty. But doubtless many specimens from Sikkim now in herbaria under the name of *P. capitata* are this plant.

Primula Littledalei, Balf. fil. et Watt. (Rotundifolia.)

Planta habitu *Potentillae* pulvinatim caespitosa rhizomate crasso elongato radices rubicundas plurimas emittente foliorum scaporumque vestigiis siccis intertextis oblecto petiolis ligulatis in siccitate inter se contortis et circum scapos strictos plus minusve volutis. Gemmae squamis persistentibus elongato-acuminatis farinosis praeditae. Folia plurima longe petiolata ad 8 cm. longa sub fructu ad 12 cm. aucta; lamina subcarnosula rotundato-cordata plus minusve cucullata circ. 3 cm. diam. dentibus marginalibus triangularibus subaequalibus acutis hydathodo terminatis notata lobis basalibus rotundatis vel subtruncatis integris sinu aperto vel subclauso supra laete viridis puberula glandulis subviscidis conspersa subtus glandulis fariniferis dense vestita; petiolus tenuis circ. 5 cm. longus sub fructu longior complanatus subcanaliculatus farinosus deinde glaber erubescens angustissime alatus in vaginam tandem fuscam persistentem expansus. Scapus foliis immersus circ. 5 cm. longus sub fructu longior farinosus umbellam ad 8-floram gerens; bractee lineari-lanceolatae acuminatae farinosae basi leviter pulvinatim incrassatae costa singula conspicua; pedicelli filiformes farinosi vix 1 cm. longi sub fructu aucti; anthopodium turbinatum parvum. Calyx subcampanulatus circ. 6 mm. longus farinosus ultra medium fissus lobis anguste ligulatis acutiusculis vel obtusis vix 1.5 mm. latis margine ciliolatis. Corollae flavae tubus in flore brevistylo cylindricus supra stamina

paulo ampliatus circ. 1.6 cm. longus extus plus minusve farinosus intus glaber annulo 5-lobato, limbi plani discus circ. 1 mm. latus, lobi aperti anguste obovati circ. 8 mm. longi plus minusve crenulati. Stamina supra medium tubi corollini inserta antherarum apicibus inclusis ab annulo 3 mm. remotis filamentis conspicuis circ. 0.5 mm. longis antheris angustis circ. 2 mm. longis apiculatis. Ovarium oblongum; stylus brevis calyce triente brevior; stigma minutum capitatum. Capsula crustacea ovoidea circ. 6 mm. longa calyce inclusa et brevior spadiceo-brunnea extus intusque farinosa ab apice valvis 5 reflexis dehiscens; placenta ovoidea circ. 4 mm. longa sessilis. Semina oblonga subcomplanata spadicea circ. 1 mm. longa testa grosse vesiculosa.

Species ex affinitate *P. rotundifoliae*, Wall. habitu *Potentillae*, corollae flavae tubo angustiore multo longiore, capsula quam calyx brevior diversa; a *P. cana*, Balf. fil. et Cave foliis basi cordatis recognoscenda.

Central Tibet. Chiefly from Gooring Valley. Lat. 30° 12' N., long. 90° 25' E., at about 16,500 ft. Coll. St. George R. Little-dale. July and August 1896. In Herb. Kew et Calc.

Tibet. Lhasa. Coll. Capt. H. J. Walton, I.M.S. 1904. Herb. Watt.

A remarkable species of the series of which the longest known species is the Nepalese *P. rotundifolia*, Wall. Sir George Watt first recognised the distinctness of the plant, marking as a new species in his herbarium a specimen collected at Lhasa by Capt. Walton when serving with the Tibet Boundary Commission in 1904. This plant has flower. Sir George Watt says: "cf. *P. rotundifolia*, Wall., but flowers yellow and petals contracted into a claw. Prof. Lipsky has shown me a good specimen in flower collected in Central Tibet, and in Kew Herbarium there is a sheet collected by Mr. St. G. Little-dale also in C. Tibet." I have seen Mr. Little-dale's specimen in the Kew Herbarium and also one of his collecting in the Calcutta Herbarium. The only flowers I have seen are on Capt. Walton's plants. Sir George Watt did not name the plant. The Kew specimen has a MS. name attached to it by Prof. Lipsky in 1905, whether before or after Sir George Watt's diagnosis I do not know, but the name has not been published, and with Sir George Watt I give the name above.

The plant shows conspicuously the multicapital habit of so many of its allies, with the dry mass of withered leaves and scapes underlying the living. In this perhaps more than in any other series of suffruticose Primulas the "dry" method of rotting of old members is marked by curious curvature and contortion of the petioles in contrast with the stiff

erect scapes. The old petioles might be readily mistaken for tendrils.

As a species in its series, the yellow colour of the flowers to which Sir George Watt alludes is in the state of our present knowledge diagnostic. The short fruits tell the species at once from *P. rotundifolia* and *P. cana*, Balf. fil. et Cave.

***Primula mallophylla*, Balf. fil. (Candelabra.)**

Glabra efarinosa. Folia 12-18 cm. longa 4-6.5 cm. lata; lamina oblonga vel oblongo-ovovata apice rotundata vel obtusa margine argute denticulata vel erosa basi in petiolum brevem alatum basi vaginantem attenuata costa media lata prominente rubra. Scapus robustus ad 30 cm. altus superne subtiliter pubescens umbellam terminalem et verticillos 2-3 multifloros (ad 15) gerens; bracteae longissimae 2.5-3 cm. longae pedicellos calycemque superantes exteriores foliaceae petiolatae lamina oblongo-elliptica inciso-dentata 1 cm. longa 7 mm. lata petioloque anguste alato, interiores lineares vix dentatae, omnes brunneo-lineatae late insertae saepe pedicellis basi con crescentes; pedicelli circ. 1.2 cm. longi anthopodio conspicuo. Calycis cupulari-tubulosi 1-1.4 cm. longi tubus inter segmenta pallidus, lobi 9-10 mm. longi anguste lanceolati saepe denticulati brunneo-venulosi et ad basim subgibbosi brunneo-striati apice hydatheo tuberculari terminati. Corollae lilacinae in floribus longistylis tubus membranaceus circ. 1.3 cm. longus calyce inclusus ruber intus supra stamina sparsissime puberulus annulatus annulo aequaliter lobato, limbi discus puberulus, lobi obovati 9 mm. longi retusi sinu mucronulato margine crenulato-erosi. Antherae apicibus ab annulo circ. 3 mm. remotis. Ovarium ovoideum; stylus longus exsertus; stigma globosum. Capsula 6 mm. longa ovoidea calyce semi-inclusa stylopodio lobulato inconspicuo coronata primo circumscissim dehiscens postea irregulariter fissa. Semina nigra subcubicalia circ. 1 mm. diam. foveolata.

Ab omnibus speciebus purpureis Sectionis Candelabrae bracteis et calycis segmentis longissimis dignoscenda.

Eastern Szechwan. District of Tchen-kéou-tin. Farges. No. 1181. In Herb. Kew, Edin., and Bonati.

A distinct and easily recognised species hitherto confused with *P. japonica*, A. Gray. In foliage the plant has the facies of other members of the Candelabra Section, with venulose leaves, most nearly those of *P. japonica*. From the few specimens I have seen I think it is likely that the plant has in general broader leaves than other species. Perhaps its nearest ally is *P. stenodonta*, Balf. fil. Its distinctive characters lie in the bracts and the calyx. The former are very long, reaching in the case of each flower beyond the calyx, and at its end each

bract—the outer ones particularly—expands more or less into an incised green laminar portion. Then the calyx is cut deeply to far below the middle, the segments—long linear-lanceolate—are adpressed to the red corolla tube which they exceed in length and each of them ends in a rounded hydathodal knob.

I have described the plant from two sets of specimens distributed from the Paris Herbarium under the number 1181 of Farges' collecting. One of these sets in the herbarium of Kew and also of Edinburgh is named *P. japonica*, A. Gray; the other, in the herbarium of Kew and also of M. Gustav Bonati of Lure, is named *P. angustidens*, Pax. Under *P. stenodonta*, Balf. fil. I shall explain the constitution of *P. angustidens*, and need say no more here. From *P. japonica* the characters of the bracts and of the calyx of *P. mallophylla* are decisively diagnostic. The calyx character is one indeed that separates it from all others in the Candelabra Section. The calyx segments are either shorter than, or barely equal to, the calyx tube in these; in *P. mallophylla* they are twice as long. Long bracts occur in the yellow-flowered *P. imperialis*, Jungh. and *P. Bulleyana*, G. Forrest; but in neither of these are they so long relatively to the whole flower as in *P. mallophylla*, nor have they the laminar expansion at the end of the bract. *P. chrysochlora*, Balf. fil. et Ward, *P. helodoxa*, Balf. fil. et Forrest, and *P. prolifera*, Wall. have long bracts, to which reference is made under these species. The species stands apart by itself in the section in which there is no doubt it is rightly placed.

The appearance of the plant in herbarium specimens seems to indicate that it is a desirable species for our gardens.

Primula Menziesiana,* Balf. fil. et W. W. Sm. (Muscarioides.)

Rosulata glanduloso-pubescent efarinosa floribus exceptis. Folia patentia ad 3.5 cm. longa petiolata; lamina circ. 2 cm. longa 1.3 cm. lata elliptica circumcirca pilis longis simplicibus glandulosis cincta apice rotundata margine regulariter crenata (cum denticulis paucis hydathodo conspicuo terminatis) basi in petiolum ad 1.5 cm. longum paullo alatum glanduloso-pilosum infra subexpansum vix vaginatum abrupte contracta utrinque laete viridis glanduloso-pubescent costa media et venis primariis paucis utrinsecus circ. 6 pinnatim patulis supra sulcatis subtus elevatis subrugulosa. Scapus ad 8 cm. longus viridis glanduloso-pubescent capitulum florum radiatim patentium subdeflexorum gerens; bractee externae virides deflexae ligulatae calycem aequantes margine lacteo-farinosae internae erectae haud

* The specific name is given to keep in memory Private Alan Menzies, 5th Batt. Cameron Highlanders, a young gardener of the staff of the Royal Botanic Garden, Edinburgh, who fell in action at Loos on 25th September 1915.

deflexae. Calyx foliaceus obliquus poculiformis pallide viridis sepalo posteriore saepe pallide purpurascente subventricosus circ. 5 mm. longus extus glaber intus lacteo-farinosus ultra medium fissus lobis inaequalibus posteriore quadrato circ. 3 mm. longo et lato apice truncato vel concavo sub-eroso margine ciliatim farinoso antero-lateralibus oblongis vel sublanceolatis angustis circ. 1 mm. latis obtusis margine ciliatim lacteo-farinosus. Corollae in flore brevistylo tubus infra cylindricus circ. 8 mm. longus albido-lilacinus extus glaber supra stamina ampliatus et pullo-violaceus intus rugosus albidus exannulatus, limbi concavi anguste pullo-violacei discus glaber circ. 2 mm. latus strumis interpetaliniis albidis oculatus, lobi erecti circ. 2 mm. longi 4 mm. lati obovati bifidi segmentis obtusis. Stamina in flore brevistylo infra os corollinum inserta filamentis albidis conspicuis antheris semiexsertis connectivo erubescente. Ovarium discoideum viride depressum; stylus brevis pallide viridis calyce longior; stigma discoideum depressum lacteum.

Species *P. bellidifoliae*, King proxima sectionis Muscarioidis foliis minoribus lamina elliptica basi subito angustata subrugulosa, scapo glanduloso-pubescente, corolla quam calyx vix triplo longiore lobis bifidis, antheris in flore brevistylo semiexsertis recedens.

Bhutan. In sandy crevices and rocky ledges, preferring shaded N.-facing situations at elevations 13,000–15,000 ft. Flowers deep blue. Head 1 inch in diameter. Cooper. No. 3470. 1914.

A charming little plant now in cultivation, discovered in Bhutan by Mr. Roland E. Cooper, collector for Bees, Ltd. Its nearest ally is *P. bellidifolia*, King, hitherto the only Himalayan species known of the Muscarioid Section. Cooper's discovery is therefore a link in the chain, which will doubtless in time be completed, uniting the Himalayan with the Western Chinese areas—in the latter we know of nine species—of distribution of the section. *P. Menziesiana* as a cultivated species has the merits and demerits of its section. Its soft hairy leaves suggest sensitiveness to our winter damp. Its flowers are amongst the brightest in the section. They are shorter and broader than in *P. bellidifolia* and radiate from the head more horizontally than is usual in the section, save in forms of *P. nutans*, Franch. The uppermost calyx lobes are daintily picked out at margin with yellow meal. The corolla limb is much larger than in *P. bellidifolia*, and the lobes are distinctly bifid.

Primula Mooreana, Balf. fil. et W. W. Sm. (*Sphaerocephala*.)

Albo-farinsa epilosa rhizomate parvo foliis plurimis rosulatis floribusque coetaneis. Folia membranacea ad 15 cm. longa;

lamina ad 4 cm. lata oblongo-obovata vel oblanceolata deorsum in petiolum viridem vix ab lamina discretum circ. 2 cm. latum vaginantem brevem alatum attenuata apice rotundata margine obscure lobulata lobulis irregulariter denticulatis denticulis crebris acuminatis hydathodo corneo terminatis supra viridis rugosa areolatim venulosa glandulis globosis stipitatis albo-fariniferis conspersa sed tamen efarinosa costa media pallide viridi venis primariis plurimis patulis sulcatis, subtus dense albo-farinosa venis omnibus prominulis ultimis intricatim favoso-reticulatis. Scapus ad 4 dm. altus robustus erectus teres dense albo-farinosus umbellam capitatam multifloram discoideam gerens; bracteae albo-farinosae ligulatae vel oblongae integrae vel apicem versus interdum denticulatae ad 1.5 cm. longae ad 4 mm. latae ultra flores juveniles prolatae calycem sub anthesi aequantes acutae vel acuminatae vel apiculatae exteriores basi pulvinatim incrassatae; pedicelli breves nonnunquam subnulli albo-farinosi ad 5 mm. longi plerumque erubescens sub anthesi deflexi anthopodio meniscoideo terminati. Calyx ad 9 mm. longus campanulatus ad medium vel ultro fissus dense albo-farinosus tubo intus excepto, lobis erectis adpressis a basi lanceolatis acuminatis aequalibus vel posteriore paullo majore. Corollae extus supra calycem albo-farinosae tubus in flore longistylus circ. 1.4 cm. longus infra cylindricus sursum subinflato-infundibuliformis 5-carinatus in brevistylus circ. 1.2 cm. longus subcylindricus ad os inflatus extus erubescens intus viridescens basi rubescente excepto transverse rugosus ad faucem rugis supremis strumosis quasi annulatus, limbus concavus circ. 1 cm. longus haematoxylo-violaceus glandulis fariniferis conspersus, lobi erecti imbricati ad 6 mm. longi ad 6 mm. lati obovati vel subquadrati vel subrotundati emarginati subpatentes. Stamina in flore longistylus basim tubi corollini versus inserta calycis tubo breviora in brevistylus medium versus inserta antherarum apicibus ab ore 6 mm. remotis filamentis conspicuis plus minusve purpureis, antheris luteis connectivo atropurpureo. Ovarium depresso-globosum vel turbinatum; stylus longus calycem aequans; stigma magnum depresso-capitatum 5-lobatum viride. Capsula ovoidea circ. 5 mm. longa calyce corollaque inclusa membranacea ab apice firmiore valvis 5 dehiscens; placenta globosa magna brevissime stipitata; semina minuta 0.5 mm. longa reniformia spadicea testa membranacea tuberculata.

Microforma *P. capitatae*, Hook. sed robustior et foliis majoribus apice latis rotundatis supra viridibus efarinosis rugulosis, umbella floribusque majoribus distinguenda.

East Himalaya:—

Sikkim. 10,000–16,000 ft. Coll. J. D. Hooker in Herb. Kew. (Farina fere omnino delapsa vel detera.)

Lachoong, Sikkim. 10,000–11,000 ft. 29th Aug. 1849. Coll. J. D. Hooker in Herb. Kew.

Yeumtong, Sikkim. 13,000 ft. 5th Sept. 1849. Coll. J. D. Hooker in Herb. Kew.

Jongri, Sikkim. 8th Oct. 1862. Coll. T. Anderson. Nos. 829, 830 in Herb. Calc.

Lachen, Sikkim. 1901. Coll. Prain's Coll. No. 310 in Herb. Calc.

Lamteng (=Lachen). 20th Sept. 1903. Coll. D. Prain in Herb. Calc.

Thangu (=Tungu). Sept. 1903. Coll. D. Prain in Herb. Calc.

This is one of the plants that have been in cultivation under the name *P. capitata*, Hook. It is the large-leaved, large-flowered plant which flowers in late summer—the best of all the plants in cultivation under the name *P. capitata*. From true *P. capitata*, Hook. and all the plants cultivated under the name it may be distinguished at sight by its large leaves with coarsely reticulate, almost honeycombed, snow-white under surface and the bright green upper surface which, although it has scattered meal-bearing glands, never becomes white.

Six distinct plants are now in cultivation under the name *P. capitata*, Hook. with or without a varietal qualification. Of these the *P. capitata*, var. *crispa* of gardens is the same as the garden plant *P. capitata*, var. *erosa*, and is not a form of the aggregate *P. capitata*, Hook. but is one of the aggregate *P. denticulata*, Sm. (see p. 160). Excluding it then, we have five plants, which are *P. capitata*, Hook. or microforms of it. Four are Indian, one is Chinese. They are easily distinguished as they grow, and it may be helpful if I give here the following key by which anyone can at sight distinguish them:—

1. Leaves on both surfaces green. Leaf-base green.
 Capitate umbel discoid. Corolla-limb open *crispa*.
 Capitate umbel globose. Corolla-limb funnel-shaped *pseudocapitata*.
2. Leaves on under side snow-white with meal. Leaf-base green. Capitate umbel discoid.
 Upper leaf-surface more or less whitened with meal. Corolla-limb open *capitata*.
 Upper leaf-surface green. Corolla-limb open *Mooreana*.
3. Leaves on under side cream-coloured with meal. Leaf-base red.
 Upper leaf-surface more or less whitened with meal. Capitate umbel globose. Corolla-limb funnel-shaped *lacteocapitata*.

There are other distinct microforms not yet in cultivation, e.g. *P. atrodentata*, W. W. Sm., *P. Craibeana*, Balf. fil. et W. W. Sm., *P. sphaerocephala*, Balf. fil., but I reserve comments upon them for a comprehensive treatment of the whole aggregate.

***Primula moschophora*, Balf. fil. et Forrest. (Bella.)**

Herba pusilla caespitosa farinosa stolonifera; stolones ad 7 cm. longi infra rosulam apicalem nudi albo-farinosi inter muscos hepaticasque pervadentes. Folia rosulata petiolata ad 1.5 cm. longa; lamina oblonga vel elliptica vel obovata vel subrhomboidea vel anguste subspathulata circ. 7 mm. longa circ. 4 mm. lata apice obtusa vel subtruncata vel subrotundata margine varie dentato-lobata deorsum in petiolum alatum lamina longiorem attenuata supra sordide viridis et glandulis fariniferis sparsim pulverulenta subtus dense albido-farinosa costa media et venis primariis regulariter ascendentibus subtus plus minusve conspicuis percursa. Scapus tenuis circ. 1.5 cm. longus folia superans vel vix superans minutissime albido-farinosis florem unum terminalem gerens; bracteae duae alternae glandulis fariniferis plus minusve vestitae subcalycinae superior major ad 3 mm. longa anguste lanceolata inferior subfiliformis minor; pedicellus nullus vel nunc 1 mm. longus; anthopodium obconoideum. Calyx infundibularis plus minusve albo-farinosus ultra medium fissus tubo extus 5-angulato lobis elongato-triangularibus vel oblongo-triangularibus subcarinatis costa media et venulis duabus lateralibus percursis apice acutis hydathodo verruculoso conspicuo terminatis. Corollae lilacinae tubus in flore longistylus tenuis in floribus heteromorphis ambobus circ. 1 cm. longus extus glaber intus ad faucem pulvinato-villosus infra in flore brevistylus transverse subrugosus, limbi concavi discus circ. 1.5 cm. latus pulvinato-villosus, lobi cuneati circ. 0.5 mm. longi ad quadrantem bifidi segmentis oblongis divaricatis. Stamina filamentis brevissimis in flore brevistylus ad os tubi corollini in flore longistylus basim versus inserta calyce inclusa. Ovarium stylopodio incrassato coronatum ovoideum; stylus longus tubum corollinum aequans, brevis calycis tubum aequans; stigma parvum subcapitatum.

Species *P. bellae*, Franch. proxima, ab ea foliis albo-farinosis haud inciso-lobatis lobis calycinis elongato-triangularibus acutis recedens et in sectione *Bella* stolonibus longis recognoscenda.

Yunnan. Shweli-Salween divide. Lat. 25° 30' N. Alt. 11,000 ft. Moist stony pastures. G. Forrest. No. 12,076, Aug. 1913. In Herb. Edin.

This is a distinct plant of the *Bella* aggregate at sight recognisable by its stolons. One ought to call them offsets. The pompon of the corolla throat is not so dense as in typical *Bella*.

Taking the pompon in the corolla throat as typical of the Bella series the following ten species belong to it:—*P. bella*, Franch., *P. Bonatiana*, Petitm., *P. coryphaea*, Balf. fil. et Ward, *P. indobella*, Balf. fil. et W. W. Sm., *P. magnobella*, Balf. fil. et Forrest, *P. moschophora*, Balf. fil. et Forrest, *P. nanobella*, Balf. fil. et Forrest, *P. oreina*, Balf. fil. et Cooper, *P. pusilla*, Wall., *P. sciophila*, Balf. fil. et Ward.

Geographically we have:—

Central and Eastern Himalaya—*P. pusilla*.

Bhutan—*P. indobella*, *P. oreina*.

E. Upper Burma—*P. coryphaea*, *P. sciophila*.

Yunnan—*P. bella*, *P. Bonatiana*, *P. moschophora*, *P. magnobella*, *P. nanobella*.

Primula optata, Farrer. (Nivalis.)

Farinosa rhizomate brevi crasso ramoso radices plurimas rubras emittente et rosulas caespitosas vestigiis fibrosis foliorum vetustorum nec squamis paleaceis tunicatas gerente. Folia ad 7 cm. longa oblanceolata vel spathulato-oblonga ad 1.5 cm. lata obtusa margine regulariter serrulata utrinque glandulis globosis fariniferis obsita subtus pallidiora plerumque linea farinosa marginali decorata deorsum in petiolum breviter vaginantem laminam subaequantem vel ea brevior attenuata. Scapus crassus humilis folia triente excedens ad 12 cm. longus viridis vel paullo purpurascens dense albo-farinosis umbellam globosam ad 10-floram (rarissime verticillum inferum) gerens; bractee nigro-purpureae a basi circ. 2 mm. lata acuminatae ad 8 mm. longae pedicellos subaequantes praesertim intus plus minusve albo-farinosae; pedicelli breves vix 1 cm. longi validi copiose albo-farinosi; anthopodium latum turbinatum. Calyx crassus nigro-purpureus extus sparsim albo-farinosis elongato-campanulatus circ. 1 cm. longus corollae tubo paullo brevior ultra medium fissus, lobis elongatis oblongis obtusis vel subacutis intus dense farinosis. Corollae violaceo-coeruleae tubus membranaceus concolor extus efarinosus infra stamina cylindricus supra ampliatus in flore brevistylo circ. 1.3 cm. longus in flore longistylo circ. 1.1 cm. longus intus erugosus supra stamina puberulus annulatus annulo angusto membranaceo-lobato pallidiore, limbi paullo cupuliformis discus circ. 1.5 mm. latus extus basi sparsim farinosus supra sparsim puberulus, lobi longe elliptici nervulis 5-7 vix ramosis neque anastomosantibus percursi circ. 1 cm. longi et 6 mm. lati integri apice rotundati vel obtusi. Stamina filamentis brevissimis antheris latis aurantiacis circ. 2 mm. longis apiculo nullo in flore brevistylo breviter supra medium tubi corollini (antherarum vix calycem excedentium apicibus ab annulo circ. 3 mm. remotis) in flore longistylo in triente infero tubi corol-

lini (antheris vix calycis tubum aequantibus) inserta. Ovarium breviter oblongum; stylus longus vix calycem aequans, brevis vix calycis tubum aequans: stigma parvum cylindricum lobulatum. Capsula cylindrica circ. 2 cm. longa et 4 mm. lata pallide straminea nitida muro subpaleaceo haud incrassato calycem tenuem haud auctum vix dimidio excedens apice dentibus 5 concoloribus brevibus saepe fissis dehiscens; placenta cylindrico-claviformis sessilis circ. 8 mm. longa. Semina oblonga angulata paullo spongiosa subcomplanata circ. 1.75 mm. longa fusco-brunnea.

Species Sectionis Nivalis bene distincta.

"Kansu. Probably this is a variety or subspecies of *P. No. 22* which is much stouter in growth, with leaves upstanding, revolute, of dark leathery green gloss, and with an invariable definite band of silver powder round their under margin, this being *very* rarely present in *P. No. 10*, where leaves are also explanate, more outlying, and of a bright emerald gloss. In both plants the capsule is very much as in *P. Maximowiczii*, a far-protruding chaffy-pale cylinder, transparent towards the flat top. Both inhabit *bare* solitary places in the red or yellow loam of the very topmost slopes and arêtes only, from 12,000–14,000 ft., among the shingle, and both stand off from *P. nivalis* in their lack of any long stock, or any stock at all, as in their healthy matted masses of white fibres, thrown off from abundant tough main roots of red." Farrer et Purdom. June 1914. *F. 122. P. No. 10.*

Mr. Farrer says also:—"Primula No. 10 (Section Nivalis, but very distinct) (*P. 'optata'*). Very much more charming than No. 8, and promising better, having no long stock, and being much more abundant in its zone of distribution. The leaves develop *while* the scape breaks into flower, at 3–4 inches: they are explanate and scarcely revolute, bright lucent green, obovate lanceolate, shorter, broader, more rounded and splayed out than in No. 8, set with regular sharp triangular teeth, diminishing to a \pm marked petiole, powderless below, but often dusted with farina on the upper face, and round the dentation of the younger leaves. Scape densely white, farinose, bracts narrow lanceolate, dark, pointed, about 4–5 mm. \pm = the pedicels. Calyx purple, farinose, densely so within, and outlined without, the lobes rather more than half its length, oval lanceolate, tube exceeding the calyx: limb cupuliform or like a shallow saucer (not a flat star, as in No. 8) scantily powdered on the outside at the base of the throat: lobes broadly ovate or obovate (ampler and larger than in No. 8) emarginate and sometimes toothed: of a lovely melting lavender blue, with a darker eye, and a strong sweet Primula fragrance overlaid by a yet stronger one of cupboards and mice.

Many flowers to the scape (which lengthens to about 8 inches in fruit), and a secondary tier is often borne, but hardly rises distinct above the first: the pedicels are shorter and stiffer than in No. 8 so that the head is a dome of blossom rather than a rayed wheel."

"Abundant in half-dry beck-beds of limestone, in red earth and ordinary limy loam full of chips, from 12,000 ft. up to the highest arêtes at 14,000 ft. (where it is most at home, in the sharply sloping soil-slides) of the great limestone mountain above Siku." June-July.

A really fine species.

Primula oreina, Balf. fil. et Cooper. (Bella.)

Suffruticosa prostrata pilosa rhizomate lignescens subcrasso ramoso repente foliorum vestigiis siccis dense oblecto. Folia petiolata subspathulata parva ad 1.5 cm. longa; lamina subcarnosula suborbicularis circ. 7 mm. longa et lata margine cartilaginea integra vel paulo et regulariter crenulata revoluta basi in petiolum aequilongum alatum circ. 3 mm. latum abrupte contracta supra atro-viridis glaber laevis venarum reti occulto subtus dense aureo-farinosa costa media prominula. Scapus tenuis ad 2 cm. longus foliis paulo longior aureo-farinosis flores 1-2 pedicellatos umbellatim gerens; bracteae 4, inferiores 2 magnae fertiles cyclicae purpurascens et farina aurea conspersae margine glanduloso-ciliatae plus minusve cucullatae et amplexicaules inaequales externa major circ. 6 mm. longa 5 mm. lata subpalmatifida lobis 3 obtusis venisque flabellatim divergentibus superiores 2 minores steriles parvulae virides; pedicelli circ. 3 mm. longi aureo-farinosi. Calyx poculiformis extus intusque (tubo intus excepto) plus minusve aureo-farinosis circ. 6 mm. longus purpurascens ultra medium fissus lobis ligulatis integris obtusis venula media conspicua glanduloso-ciliatis circ. 2.5 mm. latis. Corollae lilacinae crassiusculae in flore brevistylis circ. 1.4 cm. longae tubus cylindricus supra stamina ampliatus circ. 9 mm. longus extus glandulis fariniferis conspersus intus erugosus puberulus minute annulatus fauce pilis plurimis ex ore prolatis barbatim oclusus, limbi plani plus minusve puberuli discus circ. 1 mm. latus, lobi obovati circ. 7 mm. longi aperti bifidi segmentis divaricatis. Stamina ad medium tubi corollini antheris calycem superantibus antherarum apicibus ab annulo circ. 2.5 mm. remotis inserta filamentis conspicuis deorsum expansis antheris circ. 1.5 mm. longis connectivo fulvo. Ovarium discoideum stylopodio lato coronatum; stylus brevis vix 1 mm. longus calyce multo brevior; stigma parvum discoideum. Capsula oblonga crustacea circ. 8 mm. longa calyce intus dense farinoso omnino inclusa ab apice valvis 5 saepe 10 brevibus dehiscens;

placenta parva discoidea longe stipitata. Semina cuboidea circ. 1 mm. diam. helvola longe vesiculoso-tuberculata.

Species Sectionis Bellae foliorum forma orbiculari integra vel paulo crenulata bene distincta.

"Bhutan. Narim Thang Kurted. Alt. 14,000 ft. Flowers large, delicate, purple magenta, solitary. Leaves small, gold below, remaining on stem which rambles among scree debris, etc., for several inches." R. E. Cooper. No. 4247. 31st July 1915.

"Bhutan. Singhi. Kurted. Alt. 16,000 ft. Magenta flowers. Creeping among glacial debris." R. E. Cooper. No. 4973. Sept. 1915.

We have here a striking new species of the Bella Section, differing particularly in foliage and habit from those we already know. This is a woody spreading plant of glacial scree at high elevation, and its habit, as well as form of leaf, recall particularly the features of the Chinese *P. dryadifolia*, Franch. and *P. philoresia*, Balf. fil. et Ward. It is quite a *Dryas*-like plant. But its flower characters are those of the Bella Section—bracts—calyx—corolla. *P. indobella*, Balf. fil. et W. W. Sm. is the only species of the Section known hitherto to occur outside China, and *P. oreina* is therefore an interesting further link between the flora of the Himalayan and the Yunnan Alps.

Primula plebeia, Balf. fil. (Petiolaris.)

Parva epilosa rhizomate tenui foliis longe petiolatis. Folia ad 7 cm. longa; lamina elliptica vel oblongo-elliptica vel subrotundata ad 4 cm. longa ad 2–2.5 cm. lata membranacea subtus pallidior margine sinuato-dentata basi abrupte cuneatim in petiolum vix alatum limbo longiorem attenuata utrinque glandulis globosis brevissime stipitatis videlicet fariniferis sed in specimenibus siccis farinae inopibus conspersa. Scapus ad 5 cm. longus foliis brevior vel vix longior tenuis praesertim apicem versus cum bracteis pedicellisque glandulis forsan fariniferis plus minusve puberulus umbellam 2–4-floram gerens; bractee virides circ. 5 mm. longae pedicellis breviores lineari-lanceolatae acutae plus minusve et minutissime ciliatae; pedicelli ad 8 mm. longi stricti graciles superne in anthopodium circ. 1.5 mm. longum gradatim incrassati. Flores rosei. Calyx circ. 5 mm. longus cupularis laete viridis glandulis forsan fariniferis obscure puberulus ad medium fissus lobis oblongis apice triangulari-acutis integris uninerviis subpatentibus. Corollae tubus in flore brevistylo infundibularis circ. 7 mm. longus calycem superans in flore longistylo circ. 5 mm. longus calyce fere inclusus extus glaber intus annulatus erugosus, limbi concavi discus circ. 1 mm. latus, lobi patentes circ. 6 mm. longi obcordati vel obovati profunde emarginati. Stamina filamentis distinctis floris brevistyli ad

Correction.

Page 190, line 20. After 'species' insert
'(excepting *P. pusilla*, Wall.)'

os corollae antherarum apicibus exsertis, longistyli basim versus apicibus calycem vix superantibus inserta. Ovarium globosum; stylus brevis calycis tubo brevior; stylus longus exsertus; stigma parvum.

Species Sectionis Petiolaris ex affinitate *P. taliensis*, G. Forrest et *P. odontocalycis*, Pax; ab hac foliis longe petiolatis, scapo longiore pedicellisque brevioribus, calycis lobisedenticulatis, ab illa foliis calyceque epilosis facile distinguenda.

Valleys of Tse-tshou-pa. Alt. 8700 ft. Flowers rose. May. E. E. Maire.

A well-distinguished species amongst the Chinese members of the Section Petiolaris.

***Primula prenantha*, Balf. fil. et W. W. Sm. (Candelabra.)**

Vix rhizomatica. Folia chartacea opaca pauca rosulata petiolata ad 10 cm. longa (rarissime 12 cm.) ad 3 cm. lata, oblongo-obovata apice rotundata margine eroso-dentata denticulis hydathodo corneo terminatis, deorsum in petiolum lamina duplo breviorum alatum vaginantem sensim attenuata, supra areolatim sulcata subtus pallidiora subcinerea intricatim venuloso-reticulata venis primariis patulis obscure pulverulenta. Scapus tenuis rufus ad 15 cm. altus (sub fructu ad 25 cm.) umbellam solitariam 4-7-floram gerens rarius verticillo infero instructus nodos versus puberulo-pulverulentus; bractee infimae ligulatae ad 7 mm. longae pedicellis dimidio breviores saepe denticulatae et ad apicem subexpansae, superiores a basi lanceolatae acuminatae plus minusve pulverulentae; pedicelli ad 1.4 cm. longi validi deflexi (sub fructu erecti stricti) puberulo-pulverulenti; anthopodium inconspicuum. Flores parvi nutantes. Calyx campanulatus circ. 4.5 mm. longus crassus extus costatus inter costas tenuior rubro-striatus glandulis globosis sparsim pulverulentus breviter fissus lobis inaequalibus deltoideis vel elongato-triangularibus vel liguliformibus plus minusve denticulatis vena media prominula hydathodo verruculoso terminata. Corollae flavae (fid. Gammie) tubus circ. 7 mm. longus tubulosus annulatus intus supra stamina transverse rugosus, limbus concavus, lobi subquadrati erecti ad 2.5 mm. longi retusi. Floris brevistyli stamina sub annulum inserta filamentis antheris aequilongis, longistyli supra medium tubi corollini inserta antherarum apicibus circ. 1 mm. ab annulo remotis. Ovarium globosum; stylus brevis calyce longior vix antheris brevior, longus antheris vix longior; stigma magnum. Capsula subglobosa 5 mm. diam. rufa calycis tubo semi-inclusa stylopodio inconspicuo. Semina (matura?) complanata.

Species *P. proliferae*, Wall. affinis sed omnino minor et foliis

eroseo-dentatis, scapo vix ad 15 cm. alto, floribus parvis, corolla concava, stylopodio inconspicuo diversa.

Sikkim. Jongri. 12,000 ft. King's Collector. June 1888; Gammie. No. 208. 27th June 1891. Flowers yellow. In Herb. Calc.

Sikkim. Near Talung. 9000 ft. Cave. No. 108. 16th July 1906. In open ground, boggy. Flowers yellow, fragrant. In Herb. Calc.

In the Calcutta Herbarium is a series of specimens of three different collectings in the neighbourhood of Jongri which show a small rosulate plant, said to have yellow flowers by two of the collectors. The plant cannot be identified with any described species, and is here therefore described. On one of the sheets has been written "*Primula prolifera*, Wall., reduced form." This is suggestive. There is little doubt about its being an ally of Wallich's species—but it is not the same.

Like other *Candelabras* *P. prenantha* shows the globose glands which give pulverulence, and it may be therefore more or less farinose. It recalls in habit the Chinese *P. Cockburniana*, Hemsl. It has, like it, few leaves in the rosette, and probably they are patulous in the living plant. The terminal umbel is few-flowered, and no more than one whorl of flowers below it is ever shown. The stylopod so marked in *P. prolifera*, Wall. and its allies is here not so conspicuous. It is the smallest of the Himalayan *Candelabras*.

***Primula pseudocapitata*, F. K. Ward. (Sphaerocephala.)**

Rosulata epilosa rosulis multifoliatis caespitosis rhizomate parvo. Folia membranacea floribus coetanea ad 8 cm. longa ad 3 cm. lata oblongo-spathulata vel oblanceolata apice subrotundata vel subpraemorsa margine irregulariter denticulata neque erosa neque crispidenticulata glandulis ciliata deorsum in petiolum laminam aequantem alatum alis integris sensim attenuata utrinque viridia ac tamen glandulis stipitatis fariniferis minutis conspersa supra areolatim sulcata subtus venatione prominula intricatim reticulata venis primariis a costa media albidia arcuatim acute ascendentibus. Scapus teres ad 30 cm. altus validus dense albofarinosus umbellam capituliformem globosam multifloram gerens; bractee albo-farinosae ligulatae acutae integrae ad 1.2 cm. longae ad 2 mm. latae floribus juvenilibus longiores calycem sub anthesi subaequantes, exteriores basi pulvinatim incrassatae recurvatae; pedicelli sub anthesi 2 mm. longi anthopodio obconico abstricto terminati decurvati. Calyx albo-farinosus (tubo intus excepto) ad 6.5 mm. longus ultra medium fissus tubo breviter tubuloso 5-angulato, lobis ligulatis acutis inaequalibus adpressis apice incurvis saepe

purpurascens. Corollae supra calycem extus albo-farinosae limbus infundibuliformis disco atropurpureo lobisque amethystino-violaceis, tubus extus rubescens ad 1 cm. longus subangulatus intus supra stamina sub-viridis transverse rugosus rugis supremis flavidis strumosis ad faucem pseudoannulatum cinctus infra stamina membranaceus, limbi discus 2 mm. latus, lobi oblongi vel subquadrati ad 4 mm. longi ad 4.5 mm. lati praemorsi vel subtruncati emarginati. Stamina floris longistyli filamentis pallidis basim tubi corollini versus inserta brevistyli ad faucem antherarum apicibus ab annulo 3 mm. remotis inserta; antherae luteae connectivo purpureo. Ovarium depresso-globosum; stylus longus flavido-viridis calyce brevior; stigma rubrum capitatum lobulatum. Capsula globosa calycis tubo inclusa supra incrassata valvis 5 ab apice dehiscens.

Species ex affinitate *P. sphaerocephalae*, Balf. fil. et *P. crispatae*, Balf. fil. et W. W. Sm. foliis haud erosis, bracteis ligulatis integris distincta.

Atuntsu. 11,000 ft. F. Kingdon Ward, No. 92 A. 1911.

Amongst plants in cultivation the species which *P. pseudocapitata* resembles most is the Indian *P. crispata*, Balf. fil. et W. W. Sm. When in flower the two plants are easily separated by their inflorescence, which in *P. pseudocapitata* is globose and bears narrow funnel-shaped flowers, whilst in *P. crispata* the inflorescence forms a broad disk and the flowers develop an open limb of a more truly blue tinting. By foliage the distinction is more difficult yet is definite. *P. pseudocapitata* has not erose-margined leaves with lobation and crisped teeth as in *P. crispata*.

Ward's plant is a useful garden plant. It comes into flower about the mid-flowering period of the Capitata aggregate.

From *P. sphaerocephala*, Balf. fil. it is separated by its smaller flowers and uncut bracts.

Primula pulvinata, Balf. fil. et Ward. (Suffruticosa.)

Suffruticosa parva pulvinata efarinosa glandulis viscidis capitatis translucentibus longe stipitatis omnino molliter vestita redolens. Rhizoma lignosum multo ramosum annorum praeteritorum foliorum vestigiis siccis ferrugineis obtectum. Folia in vernatione revoluta longe petiolata ad 6 cm. longa arcuatim patentia; lamina lanceolata ad 4 cm. longa ad 8 mm. lata apice obtusa margine crenato-undulata lobulis inter crenas obtusis brevibus distantibus adscendentibus basi cuneata supra intense viridis costa media venisque primariis sulcatis subbullata infra pallidior costa media venisque primariis elevatis subreticulata utrinque glanduloso-viscida; petiolus laminam subaequans pallide viridis vel albidus glanduloso-viscidus supra

concavus subtus convexus basi expansus vix vaginans. Scapus brevis ad 1.5 cm. longus erubescens cum bracteis pedicellis-que dense glanduloso-puberulus umbellam 2-3-floram gerens; bracteae circ. 8 mm. longae virides a basi circ. 1 mm. lata acuminatae pedicellos aequantes vel eis breviores; pedicelli rubri 1-2 cm. longi fragiles; anthopodium obconoideum incrassatum magnum. Flores inter folia immersi. Calyx viridis circ. 8 mm. longus ultra medium fissus tubo poculiformi-tubuloso extus glanduloso viscido, lobis a basi lanceolatis acutis subpatentibus trinerviis integris. Corollae aureae fl. brevistyli tubus circ. 1 cm. longus cylindricus pallidior supra stamina amplius extus glanduloso-puberulus intus conspicue transverse rugosus ad os pentagonum subconstrictus annulatus annulo 10-lobato lobulis duobus strumosis ad basin cujusque petali oppositis, limbi discus circ. 1 mm. latus intensius coloratus glandulosus, lobi obcordati circ. 1 cm. longi 8 mm. lati apice emarginati recurvati subtus subalbidi ibique dense glanduloso-pubescentes. Stamina filamentis conspicuis crassiusculis antheras subaequantibus in flore brevistylis os tubi corollini versus antherarum apicibus vix exsertis inserta. Ovarium viride globosum; stylus brevis calyce multo brevior; stigma capitatum.

Species *P. pseudobracteata*, Petitm. affinis sed efarinosa haud scabrida et ad haec umbellis 2-3-floris, calyce longiore ultra medium fisso, corolla calycem triente superante recedit.

N.W. Yunnan. On precipices above a glacier two days west of Atuntsu. Alt. 11,000 ft. F. Kingdon Ward. June 1913. Growing in big tufts.

In 1913 Mr. Kingdon Ward sent to me a small dried specimen of this plant which in many ways agreed with the impression I had been able to form from Petitmengin's description of the plant named *P. pseudobracteata*, Petitm., and I included it provisionally under this name. The living plants which we now have do not confirm my earlier impression. Petitmengin speaks of his species as having the leaves white mealy below when young at least. There is no sign of this in Ward's plant, and the glandular hairs are not of the kind that produce meal. They have relatively long stalks, and the globose translucent head is coated with sticky glandular secretion. Petitmengin indeed says of *P. pseudobracteata* that it is covered with hairs which are in part glandular scabrid, but there is no suggestion of scabridity in Ward's plant. Other characters of difference between *P. pulvinata* and *P. pseudobracteata* are its calyx, which is larger, more deeply cut, and with lobes entire showing no sign of incision, its corolla tube not so much longer than the calyx, and then in the corolla itself there is the distinctive creamy white and glandular under surface of the lobes so conspicuous a feature

that had it been present in *P. pseudobracteata* it must have been recorded.

From seeds sent by Kingdon Ward to Bees, Ltd., and of which a portion was presented to us, plants have been raised and flowered both at Liverpool and in Edinburgh—the first flowering in 1915. The plant is a dainty cushion plant and, covered with its relatively large yellow flowers resting on the foliage cushion, is a pretty sight. We have not yet tried it in the open over a winter. Its aspect seems to tell that it wants the same treatment as *P. Forrestii*, Balf. fil.

***Primula radicata*, Balf. fil. et W. W. Sm. (Rosea.)**

Caespitosa nana polyrhiza farinosa epilosa. Folia ad 2 cm. longa ad 1 cm. lata; lamina coriacea elliptica vel oblonga apice rotundata margine remote et grosse dentata dentibus hydathodo prominulo terminatis utrinque glanduloso-foveolata supra sparsim subtus dense albo-farinosa costa media crassa prominente percursa venis primariis patulis immersis basi a petiolo constricta; petiolus laminam aequans vel ea brevior late membranaceo-alatus latitudine uniformis. Scapus nullus. Umbella sessilis 4-5-flora inter folia immersa; bractee involucrantes vaginantes exteriores majores ad 5 mm. longae a basi lata amplexicauli acuminatae carinatae basi in sacculum gibbosum parvum rotundatum productae; pedicelli validi bractee aequantes; anthopodium obconoideum. Calyx crassiusculus 5 mm. longus campanulatus costatus rubro-punctatus intus sparsim albo-farinosus ad trientem fissus lobis triangularibus acutis purpureis. Corollae roseae (?) crassiusculae tubus ad 1 cm. longus anguste cylindricus supra stamina subito ampliatus extus glaber intus infra stamina plus minusve puberulus in parte ampliata velutino-puberulus forsitan farinosus ad os constrictus et annulo intensius colorato instructus, limbi discus angustus vix 1 mm. latus, lobi coriacei aperti ad 3 mm. longi basi quadrati vel rectangulares apice in lobulos 2 rectangulares subtruncatos divergentes saepe emarginatos vel retusos fissi. Stamina filamentis prominulis antheris magnis 2 mm. longis in flore brevistylis supra medium tubi corollini inserta antherarum apicibus 1.5 mm. ab annulo remotis. Ovarium ovoideum; stylus brevis calyce multo brevior; stigma ovoideum.

P. roseae, Royle affinis foliis coriaceis farinosis, umbella exscapa notisque aliis differt.

A very distinct species which I have seen only in the few specimens in the Calcutta Herbarium, collected by Capt. Young-husband in 1894 in Chitral. It is placed as a variety of *P. rosea*, Royle in the Calcutta Herbarium, and I assume from that the flower colour is rose, and there is nothing in the dried form to

contradict the assumption. The material for examination is small, and I am unable to determine with certainty whether the corolla throat is really densely farinose or only glandular puberulous. The whole surface is covered as with velvet pile, and in the flower I examined the cavity was filled with sand particles which adhered more or less firmly to the surface. The annulus constricting the corolla tube is evidently darker than the rest of the corolla.

Primula redolens, Balf. fil. et Ward. (Suffruticosa.)

Suffruticosa fragrans ubique pilis albis glandulosis vestita rhizomate lignoso multicipite forsan in senectute foliorum vestigiis siccis dense oblecto. Folia petiolata sub anthesi ad 12 cm. longa; lamina oblonga ad 8 cm. longa ad 3 cm. lata obtusa margine grosse crenulata basi in petiolum fere aequilongum vix alatum supra canaliculatum evaginatum breviter cuneatim attenuata utrinque pilis albidis glanduloso-pilosa efarinosa supra bullatasubtus pallidior et favoso-reticulata costa media prominula. Scapus robustus ad 12 cm. longus umbellam ad 12-floram gerens dense albido-glanduloso-pilosus; bracteae ad 1.3 cm. longae basi ad 5 mm. latae anguste ovato-acuminatae foliaceae pluri-nerviae farina alba inter pilos albidos glandulosos plus minusve vestitae; pedicelli ad 2 cm. longi erecti glanduloso-pilosi virides; anthopodium magnum obconoideum. Calyx poculiformis ad 8 mm. longus extus glanduloso-pilosus et albo-farinosus intus plus minusve albo-farinosus ultra trientem fissus lobis ovatis trinerviis subacutis. Corollae floris brevistyli albidae vel pallide violaceae tubus infra stamina cylindricus supra paullo ampliatus extus lacteo-albus glanduloso-pilosus et albo-farinosus intus infra stamina transverse rugosus pallide luteus supra erugosus viridi-luteus exannulatus, limbi plani discus angustissimus, lobi imbricati ad 1 cm. longi obovati bifidi subtus albo-farinosi. Stamina floris brevistyli filamentis luteis distinctis infra medium tubi corollini inserta antherarum apicibus circ. 2 mm. ab ore remotis. Ovarium globosum; stylus brevis pallide viridis tubo corollino vix longior; stigma subcapitatum lobulatum.

Species ex affinitate *P. Forrestii*, Balf. fil. et *P. rufa*, Balf. fil. floribus albidis vel pallide violaceis facile distinguenda.

Yunnan. F. Kingdon Ward.

This plant, of which no dried specimens are in Ward's collection, was raised in the Royal Botanic Garden, Edinburgh, from seeds sent home by him in 1911, and presented by Mr. Bulley. It may be best described as a white or violet-flowered *P. Forrestii*, Balf. fil. It is hardier than *P. Forrestii* and is a more robust grower. Very fragrant.

Primula Reginella, Balf. fil. (Auriculata?)

Pusilla tenuis efarinosa epilosa paucifolia foliis longe petiolatis. Folia circ. 3 cm. longa; lamina crassiuscula circ. 1 cm. longa 6 mm. lata oblonga vel elliptica vel subrhomboidea obtusa margine integra basi cuneatim vel plus minusve abrupte in petiolum lamina duplo longiorem alatum infra membranaeum longe cylindrico-vaginantem attenuata utrinque concolor pilis capitatis minutissimis sparsim oblecta. Scapus folia subaequans circ. 2 cm. longus tenuis strictus pallide viridis glaber umbellam ad 6-floram gerens; bracteae virides circ. 9 mm. longae vix 1 mm. latae lineares acutae basi pallidae submembranaceae plus minusve longe vaginantes circum pedicellos cucullatae haud productae sed subinflatae; pedicelli subfiliformes stricti virides circ. 1.5 cm. longi ultra folia projecti; anthopodium ad 1.5 mm. longum obconoidum subinflatum. Calyx circ. 5 mm. longus tubulosus extus obscure pulverulentus tubo extus sepalorum costis obscure angulato viridi et minute purpureo-maculato intervallis subpergamantaceis pallidioribus ultra trientem fisso, lobis oblongis vel oblongo-triangularibus obtusis vel subacutis viridibus purpureo-maculatis. Corollae pallide roseae tubus calycem subaequans vel eo longior extus viridi-luteus glaber cylindricus supra stamina paullo ampliatus intus infra stamina laevis supra transverse aurantiaco-rugosus ad faucem annulo subregulari crenulato aurantiaco cinctus, limbi plani postea reflexi discus circ. 1 mm. latus intus aurantiacus extus purpureus, lobi aperti obovati vel cuneati circ. 5 mm. longi ad trientem in segmenta elliptica bipartiti. Stamina filamentis brevissimis antheris parvis circ. 0.5 mm. longis luteis connectivo cinereo in flore longistylis sub os tubi corollini (antherarum apicibus circ. 1 mm. ab annulo remotis calycem aequantibus) inserta in flore brevistylis ad os inserta apicibus ultra anulum exsertis. Ovarium ovoideum vel subturbinatum infra viride tenue superne stylopodio incrassato 5-areolato coronatum; stylus longus paullo exsertus brevis calycem subaequans; stigma parvum ovoideum. Capsula circ. 6 mm. longa calyce adpresso cincta cylindrica apice valvis 5 nunc bipartitis brevibus incrassatis dehiscens.

Species aspectu *P. tibeticae*, Watt et *P. pumilionis*, Maxim. ab ambabus bracteis linearibus basi haud productis facile distinguenda.

W. Szechwan. Tungnglo. Soulié. No. 879. 1893. In Herb. Kew.

W. China. Grasslands, 11,000–13,500 ft. Flowers bright mauve. Wilson. No. 4035. May 1904. In Herb. Kew.

Kansu. Ta-Tung Alps. Highest alpine turf from 14,000–15,000 ft. Bright pink. Scentless and very charming, growing

in small clusters. Farrer and Purdom. F. 561. *Primula* No. 30. June–July 1915.

Mr. Farrer's beautifully laid out and pressed specimens from Kansu come as a welcome confirmation of my diagnosis from the specimens cited above in the Kew Herbarium of this new species. Soulié's specimen No. 879 (there are three sheets) carry the Paris name *P. tibetica*, Watt. Wilson's specimens are named *P. pumilio*, Maxim. All have been referred to *P. pumilio*. But the species is separable from both *P. tibetica* and *P. pumilio* by many characters, and if I name here that of the bracts it is because it can be appreciated at a glance. In Watt's and Maximowicz's species these are characteristically saccate at the base and are moreover relatively broad and short. In *P. Reginella* there is no saccation; the anthopodium is large as in all this series and the surface layers are somewhat inflated, but there is never a sign of any prolongation downwards. In addition, in *P. Reginella* the bracts themselves are long linear nearly equalling in length the pedicels. In *P. pumilio* the bracts are quite short, often as broad as long. In *P. tibetica* they are never linear.

I had drawn up a description of the species under a name of my own coinage awaiting publication when Mr. Farrer's specimens came along with the happy suggestion of a name, and I am pleased to adopt it.

***Primula Roylei*, Balf. fil. et W. W. Sm. (*Sonchifolia* ?)**

P. obtusifolia, Royle var. *Roylei*, Hook. fil. in Fl. Brit. Ind. iii (1862), 489; Watt in Journ. Linn. Soc. xx (1884), 8 (ex parte).

P. obtusifolia, Royle in Bot. Mag. (1887), t. 6956; Pax in Engler, Monogr. (1905), 118 (ex parte).

Epilosa farinosa rhizomate parvo radicibus crassis suffulto ad collum squamis plurimis imbricatis persistentibus firmis erectis ovatis acutis 2.5–8 cm. longis circ. 2.5 cm. latis dense luteo-farinosis circumcincta. Folia ad 12 cm. longa sub fructu accrescentia in rosulam congesta; lamina coriacea oblonga vel fusiformis nonnunquam subspathulata ad 9 cm. longa ad 4 cm. lata apice obtusa margine eroso-denticulata deorsum in petiolum brevem latum ligulatum plus minusve membranaceum basi late vaginantem lamina multo breviorum attenuata infra pallidior utrinque granulosa glandulis brevissime stipitatis et capitatis fariniferis (in speciminibus siccis farina vix manifesta est et glandulae quasi puncta rubra sese ostendunt) praedita costa media lata elevata utrinque conspicua venisque primariis occultis percursa. Scapus plerumque validus plus minusve luteo-farinosus ad 20 cm. longus (sub fructu multo elongatus) umbellam

terminalem ad 25-floram gerens; bracteae submembranaceae plurimae adpressae ad 1 cm. longae a basi subvaginata gradatim acuminatim attenuatae glandulis fariniferis vestitae; pedicelli tenues ad 2.5 cm. longi bracteas longe superantes nigrescentes luteo-farinosi in anthopodium conspicuum expansi infra fructum leviter incrassati. Calyx brunneus vel nigrescens coriaceus late campanulatus ad 9 mm. longus extus intusque plerumque luteo-farinosus ultra medium fissus tubo angulato lobis oblongis obtusis venulis nigrescentibus percursis. Corollae purpureae cum oculo atro-purpureo et annulo 10-lobato farinoso luteo tubus fl. brevistyli circ. 1.3 cm. longus longistyli circ. 1.1 cm. longus, infundibularis supra stamina ampliatus extus glandulis fariniferis conspersus intus infra stamina transverse rugosus supra puberulus, limbi subconcavi discus circ. 4 mm. latus puberulus, lobi patentes imbricati magni 1.3 cm. lati et longi obcordati vel subrotundati velutini apice retusi vel subpraemorsi. Stamina filamentis conspicuis late insertis et pulvinis interstaminalibus conjunctis antheris magnis circ. 3 mm. longis in fl. brevistylo ultra annulum semi-exsertis in longistylo calycem excedentibus. Ovarium ovoideum apice conoideum et stylopodium inconspicuum formans; stylus brevis validus calyce brevior stigmatate discoideo, longus exsertus stigmatate ovoideo. Capsula discoidea circ. 5 mm. lata vertice convexa in calycis tubo cupuliformi vix crustaceo lobis patentibus inclusa apicem pedicelli leviter incrassati stricti divaricati coronans irregulariter operculatim dehiscens. Semina irregulariter angulata cuboidea brunnea spongiose areolata circ. 2 mm. diam. columnam placentalem breviter et tenuiter crustaceo-stipitatam insternentia et ab ea gradatim cadentia.

Species *P. Gammieanae*, King persimilis sed squamis latis farinosis foliorum rosulam obtegentibus, foliis vix petiolatis, calyce fructibusque seminibusque minoribus valde diversa. Ab *P. obtusifolia*, Royle longe distans fructu operculato nec septicido distincta.

Sikkim. Sandakphu to Yakalungma, 10,000–12,000 ft. Watt. No. 5376. 30th May 1881. In Herb. Edin. et Kew.

Sikkim. Sandakphu, 11,500 ft. 30th May 1902. Lace, No. 2260. Sub nom. *P. Stuartii*, Wall. var. *purpurea*. In Herb. Calc.

Sikkim. Megu, near Nepal frontier, 13,000 ft. Ribu et Rhomoo. 15th June 1912. In Herb. Edin.

Sikkim. Sandakphu, 12,000 ft. Cave. Flowers violet. 30th May 1913. In Herb. Edin. Very typical.

Sikkim. Jongri, 14,000 ft. Rhomoo. No. 928. Flowers dark purple. 12th Aug. 1913. In Herb. Edin.

Sikkim. Tari, 13,000 ft. Cave. 29th May 1914. In Herb. Edin.

Nepal. Soon-soon-nangi, nr. Kanglanamo. King's Collector. June 1887. In Herb. Calc. Very typical.

Var. *acaulescens*, Balf. fil. et W. W. Sm.

Forma escaposa. Flores longe pedicellati pedicellis filiformibus folia superantibus ad 12 cm. longis ex axillis foliorum quasi singillatim vel fasciculatim orientibus.

Sikkim. Sandakphu to Yakalungma, 10,000–12,000 ft. Watt. No. 5376. 20th May 1881. In Herb. Edin. et Kew. Clarke. No. 34,973. 5th June 1884. Sub nom. *P. petiolaris*, Wall.

This purple-flowered species has been confused with *P. obtusifolia*, Royle and is one of the plants included by Hooker in his *P. obtusifolia*, Royle var. *Roylei*. Pax does not recognise Hooker and Watt's var. *Roylei* and sinks it in *P. obtusifolia*. But *P. obtusifolia*, Royle* is a Western Himalayan species; it does not occur in Sikkim, and is a very different plant from all Sikkim species; it belongs to the Nivalis Section. *P. Roylei* is one of a series of Eastern Nepal, Sikkim, Tibet, and Bhutan plants which find their alliance in the Chinese species of the Sonchifolia Section and in the Petiolaris Section. The fruit characters separate them widely from *P. obtusifolia*. Possibly we may have to unite in one section Sonchifolia and Petiolaris, but at the moment I cannot discuss this question, as material for a decision is still lacking. *P. Roylei* is only one of several species that have been confused with *P. obtusifolia*. Others are *P. Gammieana*, King, *P. Griffithii*, Watt, *P. macrophylla*, Don, *P. obliqua*, W. W. Sm., *P. purpurea*, Royle, *P. spathulata*, Royle, *P. Stuarti*, Wall., *P. Tanneri*, King. It has been in cultivation for many years under the name *P. obtusifolia*, and is the plant figured under that name in the Bot. Mag. (1887), t. 6956. In the Report of the Primula Conference, 1913, there is a figure of it as cultivated under that name at Edinburgh. My remarks upon *P. obtusifolia* as a garden plant quoted by Sir George Watt† refer to *P. Roylei*.

P. Roylei is spread over West Sikkim and the eastern boundary of Nepal. It affects altitudes of 12,000–14,000 ft., and, as the list of localities given above shows, I have seen specimens collected at various stations from Sandakphu in the south to Kanglanamo and Jongri in the north. Sir George Watt writes of it in his field notes as growing singly on damp grass-covered hills, covering miles of country with its pale purple flowers with yellow annulus. He also says that its scent is "oppressive metallic said to give headache," contrasting with the yellow-flowered *P. obliqua*, W. W. Sm. of which "the flowers are much more pleasantly scented." From Sir George

* Royle Illustr. Bot. Himal. (1839), 311, t. 77. f. 1.

† Watt, Observations on Indian Primulas in Journ. R.H.S. xxix (1904), 1316.

Watt's field notes I may quote further. The plant has a "stem short erect surrounded by broad scales 1 inch in diameter, and $1\frac{1}{2}$ to 3 inches long, coated with yellow farina. The leaves are sessile oblong spatulate, broadly speaking, or ovate oblong sheathing subacute erose 3-4 inches long, never more than half the length of the peduncle. Peduncle mealy at extremity and generally present but, as in the English primrose, often wanting, the pedicels being then very long. Bracts forming a whorl not spurred ovate acuminate closely adpressed to pedicels and about half the length. Calyx large wide loose dark brown prominently angled half cleft into 5 linear subobtusate sepals mealy in sinus. Pedicels mealy at union with calyx. Flowers large, 1 inch in diameter and tube $\frac{3}{4}$ inch, pink purple with dark purple ring around the yellow mouth. Corolla tube inflated upwards twice the length of calyx; limb flat rotate very broad oblong obtuse very slightly emarginate throat constricted by a yellow annulus of from 5-10 irregular though prominent teeth less prominent in the short-styled forms. Ovary globose completely hid within the loose calyx."

It is fortunate that we have this comprehensive field note by Sir George Watt, recording his observation of two forms which the plant exhibits—a caulescent and an acaulescent—for isolated dried specimens might otherwise have been misleading. The scapeless state—which may have the name var. *acaulescens*—is one of the suppression of the scape accompanied by elongation of the pedicels and also of the subtending leaves, bringing about the condition which occurs in *P. acaulis*, in contrast with that of *P. elatior* or with that of the caulescent forms of *P. acaulis* which correspond with the normal state of *P. Roylei*.

In its typical state *P. Roylei* is recognised from its near ally *P. Gammieana* of Eastern Sikkim and Tibet by the broad persistent farinose leaf-scales beneath the foliage rosette, by the absence of long petioles in the flowering stage, by thicker leathery leaves, by the shorter flower pedicels which do not thicken so much under the fruit, by the less woody calyx under the fruit and its longer pointed lobes, by the narrower hardly woody placental stipe, and by the smaller seeds.

Primula strumosa, Balf. fil. et Cooper. (Elongata.)

Planta epilosa rhizomate parvo foliisque plus minusve erectis vaginis longis suffultis. Folia petiolata coriacea vel subcarnosula longe petiolata ad 10 cm. longa; lamina oblanceolata vel sublanceolata ad 4.5 cm. longa 2 cm. lata deorsum in petiolum vaginantem longum erectum membranaceo-alatum erubescens sensim attenuata apice obtusa vel rotundata margine leviter subcartilaginea irregulariter crenato-denticulata utrinque

glandulis plus minusve pulverulenta efarinosa supra laevis atro-purpurea vix venulosa subtus pallidior costa media elevata caeteroquin obscure reticulato-venulosa. Scapus ad 18 cm. altus validus infra glandulis fariniferis conspersus nunc erubescens apicem versus atro-purpureus et aureo-farinosus umbellam ad 8-floram floribus nutantibus gerens; bracteae atro-purpureae aureo-farinosae a basi lata lanceolatae acutae cucullatae carinatae basi extus pulvinatim incrassatae; pedicelli ad 1 cm. longi atro-purpurei aureo-farinosi nutantes; anthopodium turbinatum magnum ad 2 mm. longum. Calyx crasse coriaceus campanulatus circ. 5 mm. longus atro-purpureus extus intusque aureo-farinosus ad medium fissus tubo angulato lobis ovatis vel oblongis obtusis. Corollae aureae aurantiaco-oculatae tubus in flore longistylus circ. 1.2 cm. longus infra cylindricus angustus supra stamina ampliatus extus plus minusve aureo-farinosus intus erugulosus annulatus annulo aurantiaco lobulato-crenulato, limbi discus circ. 2 mm. latus dense pubescens, lobi subrotundati vel oblongi circ. 8 mm. longi crenulati. Stamina in flore longistylus basim tubi corollini versus inserta ultra calycem prolata filamentis validis deorsum expansis strumis corollinis inter se conjunctis, antheris ad 2 mm. longis luteis connectivo fulvo. Ovarium globosum; stylus longus tenuis corollae tubo brevior; stigma cylindricum angustum ab annulo 2.5 mm. remotum.

Species *P. elongatae*, Watt affinis sed foliis subtus efarinosis, calycis lobis brevibus obtusis, corollae tubo brevior, staminibus strumoso-conjunctis diversa.

Bhutan. Champa Pumthang. Alt. 14,000 ft. Flowers yellow, golden eye. Inflorescence yellow-mealy. Open turf among boulders. R. E. Cooper. No. 4072. 24th June 1915.

None of the writers on Indian Primulas has made clear the character limits of *P. elongata*, Watt, a species which collectors have mixed up with *P. sikkimensis*, Hook., with *P. Stuartii*, Wall., and with *P. obtusifolia*, Royle. I shall give elsewhere a critical account of *P. elongata*. Here I need only say that it is separated by abundant characters from the three species with which it has been confused, and that we know of it now from Bhutan as well as from Sikkim. The plant I am describing here recalls *P. elongata* in habit and size and also in colour of flower but wants the mealiness—very characteristic in form—of the under surface of the leaf; the calyx is much smaller and the lobes are obtuse and have a different venation; and the stamens have at their base swollen cushions of the corolla joining them and forming a sort of second annulus.

Primula vernicosa, F. K. Ward. (Petiolaris.)

Pusilla efarinosa foliis vix petiolatis rosulatis glandulis clavatis dense obsitis secretionem viscida saepe vernicosis, rosula poculiformi basi squamis parvis submembranaceis circumcincta. Folia crassiuscula squamas gradatim sequentia ad 3 cm. longa ad 1.5 cm. lata oblanceolata vel oblonga apice obtusa margine quasi suberosa dentibus acuminatis inaequalibus recurvis hydathodo terminatis glanduloso-ciliolatis circumcincta basi integra deorsum paullo attenuata late inserta evaginata utrinque concoloria costa media lata pallidiore supra plana subtus elevata venis primariis penninervatim adscendentibus percursa. Scapus brevissimus crassus saepe vix 3 mm. longus sub fructu ad 6 cm. elongatus viridis umbellam 2-3-floram inter folia immersam gerens; bractae 3-4 a basi subamplexicauli liguliformes apice acuminatae circ. 7 mm. longae 1.25 mm. latae virides utrinque et margine glandulis elevatis viscidis obtectae; pedicelli sub anthopodio fere nulli circ. 2 mm. longi crassi virides glandulosi in anthopodium magnum circ. 3 mm. longum et latum expansi. Calyx ventricosus-poculiformis crassus viridis circ. 1 cm. longus (sub fructu auctus) extus dense viscido glandulosus intus glandulis longioribus conspersus lobis circ. 3.5 mm. longis imbricatis subrotundatis concavis vertice 3-5-dentatis (dentibus subpatentibus triangularibus hydathodo-terminatis glanduloso-ciliatis) venulis 7-9 translucentibus flabellatim divaricatis percursis. Corollae albae ubique plus minusve glandulosae tubus basi cylindricus sursum ventricosus ad os constrictus calyce inclusus et eo brevior subcarnosulus annulatus annulo albo dense glanduloso 10-lobo in faucem protruso, limbi discus concavus circ. 1 mm. latus glandulosus, lobi circ. 5 mm. longi 2.5 mm. lati oblongi basi subconstricti apice obtusi vel subtruncati. Stamina fl. longistyli filamentis conspicuis circ. 1 mm. longis deorsum expansis prope basim regionis corollinae ventricosae inserta antheris linearibus apiculatis circ. 1.25 mm. longis. Ovarium globosum viride; stylus longus tubum corollinum aequans; stigma ovoideum bilobum. Capsula convexa discoidea circ. 8 mm. lata quoad dimidium inferius tubo calycis membranaceo inclusa supra subcrustacea pseudo-operculata irregulariter rupta; placenta late discoidea stipite crasso. Semina spadicea subcuboidea circ. 1 mm. diam.; testa vesiculoso-tuberculata.

Species *P. taliensi*, G. Forrest affinis sed minor, pilorum inopia floribusque inter folia immersis valde diversa.

Yunnan. Mekong-Salween Divide, W. slope. 12,000 ft. F. Kingdon Ward. No. 94. June 1911. "Growing in open damp situations in Abies forest. The immense root system and closely packed leaves may be due to the coldness of the soil on this shaded north slope where snow was still lying."

Tibeto-Chinese frontier. Ka-gwr-pw. Doker la, 14,000 ft. F. Kingdon Ward. No. 794. 18th July 1913. Mossy banks. Rhododendron forest.

A distinct species resembling in growth *P. taliensis*, Forrest and marked out by its glands and calyx. The features of these organs indicate the place of the species in the Petiolaris Section. The toothing at the summit of the calycine lobes and the conspicuous radiating venation of the lobes are remarkable.

The species is in cultivation from seeds sent by Kingdon Ward to Bees, Ltd. Of plants raised from these seeds, some of which were presented to the Royal Botanic Garden, Edinburgh, by Mr. A. K. Bulley, several have flowered. From such a first flowering experience tells me to be cautious in estimating the horticultural value of the Primulas. Our plants have produced small short-stalked clusters with successional white flowers which nestle amongst the green leaves. The plant looks as if it would be a good grower, and if it covers itself with many trusses it should be as worthy of a place in gardens as some of the cushion Androsaces.

***Primula xanthopa*, Balf. fil. et Cooper. (Yunnanensis.)**

Caespitosa aureo-farinosa epilosa rhizomate tenui elongato circ. 1 mm. diam. alabastra axillaria plurima et radices albas profusas emittente infra foliorum praeteritorum vestigiis siccis dense oblecto. Folia membranacea petiolata ad 6 cm. longa; lamina plana oblonga vel subelliptica ad 3 cm. longa ad 1.5 cm. lata apice rotundata grosse serratim inciso-dentata dentibus acuminatis apiculatis basi integra in petiolum cuneatim attenuata supra atro-viridis sed tamen glandulis farinae potentibus conspersa subtus dense aureo-farinosa costa media venisque primariis acute adscendentibus utrinque subprominulis; petiolus lamina longior ad 5 cm. longus tenuis angustissime alatus basi expansus dense aureo-farinosus. Scapus delicatus ad 10 cm. longus plus minusve aureo-farinosus flores 1-3 umbellatim gerens; bracteae 2-4 cyclicae inaequales senior maxima ad 6 mm. longa vix 2 mm. lata ligulata acutiuscula cucullata integra nunc minute denticulata uninervia plus minusve aureo-farinosa juniores minores; pedicelli filiformes ad 1 cm. longi aureo-farinosi stricti plus minusve erecti; anthopodium obconoidum parvum. Calyx circ. 6 mm. longus aperte campanulatus viridis extus intusque aureo-farinosus ultra medium fissus tubo 5-costato lobis oblongis acutis uninerviis patentibus sinuatis. Corollae purpureae aureo-oculatae tenuiter membranaceae tubus cylindricus supra stamina paulo ampliatus in flore brevistylis circ. 1 cm. longus in longistylis circ. 8 mm. epilosus efarinosus erugosus limbo pallidior, limbi plani discus circ. 2.5 mm. latus dense aureo-

farinosus, lobi ad 8 mm. longi obovati imbricati bifidi segmentis divaricatis. Stamina filamentis brevissimis subnullis antheris circ. 1 mm. longis in flore brevistylis ad faucem antheris fere exsertis in longistylis infra medium tubi corollini antheris calycem vix superantibus inserta. Ovarium ovoideum; stylus longus corollae tubum aequans brevis calycem aequans; stigma discoideum margine revolutum. Capsula calycem aequans inclusa oblonga circ. 5 mm. longa infra membranacea supra incrassata ab apice valvis 5 ad trientem dehiscens; placenta cylindrica circ. 2.5 mm. longa stipite tenui circ. 1 mm. longo. Semina fulva complanata elliptica circ. 0.75 mm. longa breviter vesiculoso-tuberculata.

Species Sectionis Yunnanensis foliis longe petiolatis et grosse inciso-dentatis, corollae disco aureo-farinoso facile recognoscenda.

Bhutan. Dong la, Lingtsi and Tashiyangsi Kurted. Alt. 12,000 ft. Flowers purple, petals sinuate, yellow eye. Growing on mossy stones under Abies forest. R. E. Cooper, No. 4393. 10th Aug. 1915.

Bhutan. East of Lingtsi Kurted. Alt. 12,000 ft. Flowers purple. Corolla lobes wavy. On mossy rocks under Abies forest. R. E. Cooper, No. 4977. Sept. 1915.

From the standpoint of geographical distribution a most interesting species. *P. xanthopa* is a characteristic member of the Section Yunnanensis of which *P. tenella*, King is the only species hitherto recognised outside China. Like other Bhutan species described in these pages it is a link between the Himalayan and West Chinese Floras. The plant resembles in its inflorescence *P. yunnanensis*, Franch. itself but is taller. The flat membranous leaves with deeply incised margins borne on long petioles distinguish the plant from all Chinese allies. It shows the characteristic decay of the leaves by gradual desiccation which we find in the Yunnanensis series associated with delicate rhizomes and stolons. This character makes them resent our outdoor winter climate. They seem to rot off at once if the old desiccating leaves are kept damp.

Fifteen of the forty species of *Primula* described in the preceding pages are the result of more critical examination in the light of recently acquired knowledge of the *Primulas* hitherto described from the East and West Himalaya; eight are Bhutanese, the outcome of R. E. Cooper's explorations; the others are Western Chinese gathered by Forrest, Kingdon Ward, Farrer and Purdom, and Maire, one only being the result of differential diagnosis in older Chinese collections. They by

no means exhaust the number of new species of which material for description is in our hands. Mr. Craib has recently completed an exhaustive study of the Section Petiolaris, and descriptions by him of eleven new species will appear shortly in these "Notes." Many of the species described here are in cultivation, and the following have flowered:—*P. aerinantha*, *anisodora*, *brevicula*, *cardiophylla*, *conica*, *crispa*, *crispata*, *helodoxa*, *lacteocapitata*, *Menziesiana*, *Mooreana*, *pseudocapitata*, *pulvinata*, *redolens*, *Reginella*, *Roylei*, *vernica*. Of those most recently introduced are:—*P. helodoxa* of the Candelabras with bright yellow flowers; *P. anisodora* of the same Section but too like an *Auricula* in flower for its own sake as a garden plant but with potentialities for crossing; *P. minor* and *P. brevicula* of the Pulchella series are neat dwarf plants and will be valuable in the garden when we learn how in our climate to save them from the collar rot which seems to attack more or less all species that have a *Nivalis* ancestry; *P. pulvinata* and *P. redolens* are, I fear, likely to be difficult in the open as is their relative *P. Forrestii*; of the three Muscarioids, *P. aerinantha*, *P. conica*, and *P. Menziesiana*, the last named is, I think, one of the most charming of its Section—a Section containing many delightful species which if treated as biennials well reward the care bestowed upon them; *P. Reginella* is like a miniature *P. tibetica*.